Arithmetic We Need

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Arithmetic We Need

GUY T. BUSWELL

WILLIAM A. BROWNELL

IRENE SAUBLE

CLARE W. MAEDEL

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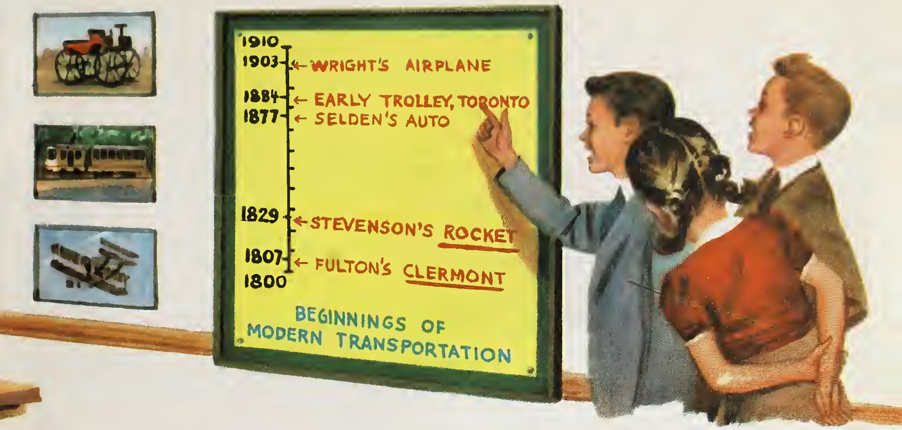
1910
1903 ← WRIGHT'S AIRPLANE
1884 ← EARLY TROLLEY, TORONTO
1877 ← SELDEN'S AUTO
1829 ← STEVENSON'S ROCKET
1807 ← FULTON'S CLERMONT
1800
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1

Attendance: SEPT. 17-20
WEDNESDAY - 58,642
THURSDAY - 46,001
FRIDAY - 60,987
SATURDAY -
Tickets:
ADULTS $1.00
CHILDREN .50

Reading and Writing Large Numbers

5- and 6-place numbers [O]

1. Bob's teacher took the children in the class to Hampton Fair. From the sign, Bob read how many people had attended the Fair each day. Can you read those numbers?

We usually read numbers from left to right but, if you have trouble reading large numbers, study the work below. Try reading first the three figures at the right end of the number. Then keep building on until you can read all of the number.

Last year, the total attendance at the Fair was 198,642.

To help you read 198,642,
first read ⟶ 642;
next read ⟶ 8,642 (8 thousand 642);
then read ⟶ 98,642 (98 thousand 642);
then read ⟶ 198,642 (198 thousand 642).

2. Read each figure in the box at the right and tell its place value.

3. The 1 in hundred-thousand's place and the 9 in _?_ place and the 8 in _?_ place are read together as **198 thousands.**

Place Value	Hundred thousand	Ten thousand	Thousand	Hundred	Ten	One
	1	9	8,	6	4	2

Read each number in rows 4 and 5. Then write it on the board with place-value names, as 198,642 is written in the box.

	a	b	c	d
4.	7,840	69,750	470,906	478,130
5.	34,026	146,208	600,542	608,207

6. Where are the commas placed in the numbers above?

7. Tell which places are filled by zeros in the numbers above.

[W]

8. On your paper write three 4-place numbers.

9. Write three 6-place numbers so that each has a zero in ten-thousand's place.

10. Write "six thousand nine hundred eleven" using figures.

Taking Large Numbers Apart

To show meaning [O]

A

1 = 1 × 1
10 = 1 × 10
100 = 1 × 100
1,000 = 1 × _?_
10,000 = 1 × _?_
100,000 = 1 × _?_

B

4,444
→4 = 4 × 1
→40 = 4 × 10
→400 = 4 × 100
→+4,000 = 4 × 1,000
4,444

1. In box A, each red 1 has a different value because its place value is different. Tell the place-value name of each red 1. What are the missing numbers in box A?

2. Taking numbers apart, starting from the right or from the left, helps to show their meaning. Tell the value of each 4 in the number 4,444 starting from the right (box B).

3. In the number 4,444 each 4 has a value _?_ times as great as that of the 4 to its right.

4. Tell the value of each figure in the number 248,759 starting with the 2. For help, study the work in box C.

5. How much smaller do we make the number 657,342 if we change the 7 to 0? if we change the 5 to 0?

C

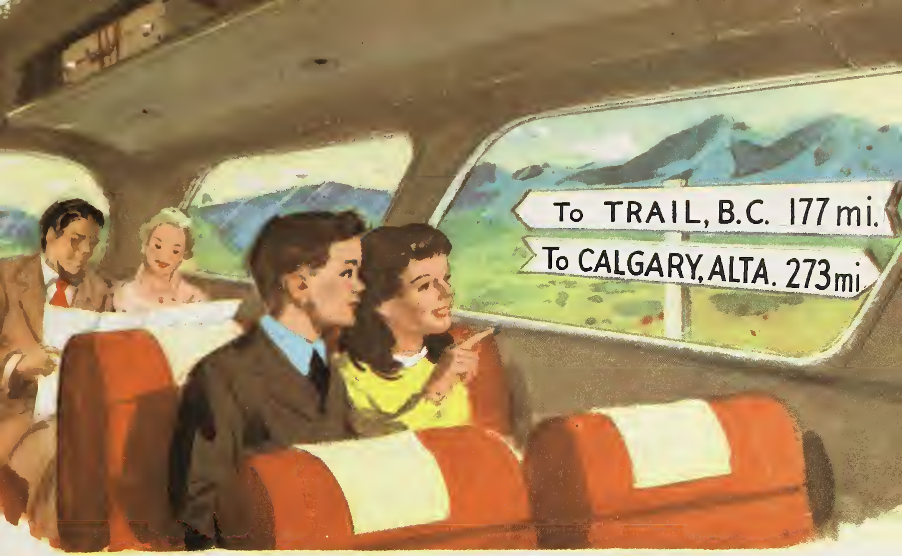
2 × 100,000 = 200,000
4 × 10,000 = 40,000
8 × 1,000 = 8,000
7 × 100 = 700
5 × 10 = 50
9 × 1 = 9
2 4 8 , 7 5 9
248,759

[W]

6. Take apart 375,246, as in box C, to show its meaning.

7. Write the largest and the smallest
a. 4-place number; b. 5-place number; c. 6-place number.

8. Write at least ten different 5-place numbers using only the figures 1, 2, 3, 4, and 5.


To TRAIL, B.C. 177 mi.
To CALGARY, ALTA. 273 mi.

Using Rounded Numbers

To nearest hundred; nearest thousand [O]

1. Jim said, "We have to go about 300 miles farther." From the picture, tell what number Jim was looking at.

2. "Yes, we've come about 200 miles from Trail," said Betty. Why can Betty say this?

Jim and Betty had **rounded** the numbers, 273 and 177, **to the nearest hundred.**

3. On a trip, Sam's family drove 3,794 miles. Why could Sam tell his class that they drove about 4,000 miles?

Sam had rounded 3,794 **to the nearest thousand.** Rounded numbers are helpful when we do not need to be exact.

Round the numbers in columns a to d to the nearest hundred; then to the nearest thousand. Round the numbers in columns e and f to the nearest dollar; then to the nearest ten dollars.

	a	b	c	d	e	f
4.	5,149	4,370	85,214	717,003	$38.15	$143.75
5.	2,708	45,891	62,833	529,899	$72.89	$278.39

Numbers Written with Letters

Roman numerals [O]

1. Long ago, Romans wrote their numbers using only 7 letters. Try to read the Roman numerals on the books.

2. Our numbers are called Arabic numbers. Read the following Roman numerals and the Arabic numbers they stand for:

Roman:	I	V	X	L	C	D	M
Arabic:	1	5	10	50	100	500	1,000

3. The value of many Roman numerals is found by adding the values of two or more of the 7 letters. Explain these:

VI means 5 plus 1, or _?_
XV means _?_ plus 5, or _?_
XVI means _?_ plus 6, or _?_
LVIII means _?_ plus 8, or _?_

4. The values of these 6 numerals are found by subtracting:

IV means 5 less 1, or _?_
IX means 10 less 1, or _?_
XL means 50 less _?_, or _?_
XC means _?_ less 10, or _?_
CD means _?_ less _?_, or _?_
CM means _?_ less _?_, or _?_

5. The values of other numerals are found by adding to a subtracting pair. For XCVI, find the subtracting pair, XC, or 90. Then add to it the value of VI, or _?_. XCVI means _?_.

6. Read each of these Roman numerals:

XC; XIII; XXIX; LXV; CD; MCL

[W]

Arabic	Roman
4	IV
8	VIII
12	XII
16	XVI

7. Count by 4's from 4 to 40. Write these numbers, using both the Arabic and the Roman numerals. Begin as in the box.

8. Do the same for counting by 9's to 90.

9. Write Arabic numbers for the following Roman numerals:

XCV LXII LVII XXVII XIX CXX

Using Our Numbers

[W]

1. A library kept this record of books taken out each month last year. Copy it and put the comma in each number. Write the full name for each month instead of the abbreviation.

Jan.	98754	July	121057
Feb.	94050	Aug.	96754
Mar.	105671	Sept.	120500
Apr.	99400	Oct.	109375
May	115060	Nov.	96047
June	119975	Dec.	94700

2. Copy the above numbers in a column, in order of size. Write the largest one first, then the next largest, and so on.

3. What is the place value of the 9 in each number below?

a. 40,973 **b.** 8,069 **c.** 9,508 **d.** 903,718 **e.** 96,780

4. What place does 0 hold in each number in Ex. 3?

5. Write in words each number in Ex. 3.

6. Use Roman numerals to write: **a.** 26; **b.** 42; **c.** 75

7. In Arabic numbers write: **a.** XVII; **b.** CMLV; **c.** XLV

What Addition Does

Like-numbers [O]

1. When the boys are on the merry-go-round, how many children will be riding? 3 _?_ and 4 _?_ are _?_ children.

2. Mary put 4 oranges, 3 apples, and 5 pears on the fruit plate. That made how many pieces of fruit in all?

3. Eight plates and 9 cups are how many dishes?

4. Six cupcakes on one plate, five on another, and four on another make a total of _?_ cupcakes.

5. Jim spent 15¢ for candy and 10¢ for ice cream. How much did he spend for both?

When we put together or think together groups of things or numbers alike in some way and find how many in all, we are adding.

6. In the box are two ways to write an addition fact. Read the fact.

7. What do we call the numbers that are added?

8. What do we call the number that shows how many in all?

8 *addend*
+9 *addend*
17 *sum, or total*

8 + 9 = 17

How Well Do You Know the Addition Facts?

Inventory Test 1 [W]

Write only the sums (answers) on folded paper.

	a	b	c	d	e
1.	8 + 8	9 + 8	6 and 4	9 plus 6	6 + 6
2.	7 + 8	4 + 8	8 and 5	8 plus 7	9 + 4
3.	5 + 5	7 + 9	9 and 3	4 plus 9	8 + 3
4.	5 + 8	8 + 9	6 and 8	7 plus 6	9 + 9
5.	4 + 7	7 + 4	5 and 7	5 plus 6	6 + 9
6.	7 + 7	5 + 4	3 and 7	9 plus 5	8 + 4
7.	7 + 3	6 + 5	5 and 9	6 plus 7	7 + 5
8.	4 + 5	9 + 7	4 and 6	3 plus 9	8 + 6

Make study cards for facts you missed.

Helps in Learning Addition

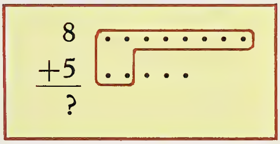
[O]

1. Zero and any number is that number.

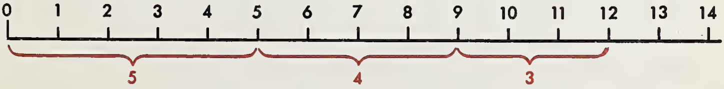
2. Doubles are helpers for near-doubles. $6 + 6 = 12$, so $6 + 7 = ?$ Give four other doubles and near-doubles.

3. When the sum is a teen number, first make a 10, as in the box.

For 8 and 5 *think*, "8 and 2 are 10. Then $10 + 3 = 13$, so $8 + 5 = ?$"



4. To add on a number line, count to the right. What numbers are added on the number line below? Would the sum change if the numbers were added in the order $3 + 5 + 4$?



Can You Add by Using Families?

Inventory Test 2 [W]

Write only the sums on folded paper.

	a	b	c	d	e
1.	29 + 4	39 and 5	8 + 15	8 plus 23	49 + 7
2.	17 + 3	47 and 4	6 + 23	4 plus 18	57 + 6
3.	38 + 7	25 and 8	5 + 39	3 plus 25	45 + 2
4.	26 + 4	30 and 6	4 + 24	6 plus 38	63 + 7
5.	19 + 6	29 and 3	8 + 44	3 plus 49	36 + 9
6.	45 + 4	18 and 2	9 + 31	6 plus 27	28 + 9
7.	27 + 5	36 and 5	4 + 26	4 plus 53	18 + 6

Helps in Adding by Families

[O]

1. The examples in box A belong to the 6 + 3 family. To what family do the examples in box B belong?

A

6	16	36	96	6
+3	+3	+3	+3	+53
9	19	39	99	59

B

5	15	45	5	25
+7	+7	+7	+87	+7
12	22	52	92	32

2. For each box tell 3 other examples in the same family.

Name each family and give the sums for Ex. 3 to 10 below.

3. 14 + 5
34 + 5
24 + 5

4. 26 + 4
46 + 4
56 + 4

5. 19 + 7
39 + 7
59 + 7

6. 29 plus 8
19 plus 8
39 plus 8

7. 18 + 7
28 + 7
48 + 7

8. 5 + 17
5 + 47
5 + 87

9. 6 + 29
6 + 49
6 + 79

10. 47 and 3
67 and 3
57 and 3

Give 3 other facts for each family (Ex. 3–10).

[W]

There are two kinds of examples in adding by families. On folded paper, write answers only for Ex. 11 to 13.

1st kind: There are not enough ones to make another ten.

	a	b	c	d	e	f	g	h
11.	14	37	40	16	5	3	45	22
	+4	+2	+9	+3	+23	+42	+3	+7

2d kind: There are exactly enough ones to make another ten or there are enough ones to make a new ten and some more.

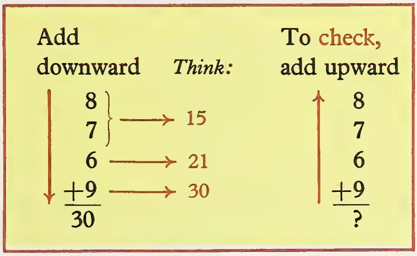
12.	37	25	12	46	1	6	53	24
	+3	+5	+8	+4	+69	+24	+7	+6
	4?	3?	2?	?	?	?	?	?
13.	36	24	49	38	8	7	5	43
	+7	+8	+7	+6	+53	+25	+36	+8
	4?	3?	5?	?	?	?	?	?

Adding Columns of Numbers

[O]

We often use the two kinds of adding by families when we add columns of numbers. Explain the work in the box.

To add quickly *think*, "15, 21, 30."



[W]

Write in columns the examples in rows 1–3. Add and check.

	a	b	c	d
1.	8 + 5 + 6	9 + 9 + 8	5 + 7 + 9	3 + 8 + 9 + 2
2.	7 + 9 + 4	9 + 6 + 7	9 + 8 + 6	8 + 7 + 5 + 6
3.	6 + 8 + 7	4 + 8 + 5	9 + 8 + 9	6 + 7 + 9 + 5

Things to Remember about Addition

General Ideas [O]

Do you remember these helps for adding numbers?

a. Write the numbers with ones under ones, tens under tens, hundreds under hundreds, and so on.

b. Add ones first, then tens, then hundreds and so on.

c. Add downward. Check by adding upward.

d. Add the numbers in order. Do not skip around.

e. Carry when the sum in any column is 10 or more.

f. Add first the number carried to the next column.

g. Add quickly by the look-and-think method. In adding 8 + 9 + 6 + 9 *think*, "17, 23, 32."

h. In adding money numbers, put a cent point in the sum to show two places for cents. $6.50 (6 dollars and 50 cents)

The key to success in adding columns is to know the addition facts perfectly and to be able to add rapidly by families.

How Well Can You Carry in Addition?

Inventory Test 3 [W]

Write only the sums on folded paper.

1.	2.	3.	4.	5.
367 +428	489 +760	$9.97 +0.86	584 +7,659	$98.56 +74.68

6.	7.	8.	9.	10.
987 37 8 +56	864 797 68 +359	$5.42 0.78 6.39 +0.07	5,867 759 3,070 986 +54	$75.93 0.86 3.47 0.09 +86.59

If this work was hard for you, study the helps on pages 11 and 12. Then take this test again.

Helps for Carrying in Addition

[O]

1. Try to explain Ex. A to F before doing Ex. 2 to 6.

Carrying Tens		Carrying Hundreds		Carrying both Tens and Hundreds	
A	B	C	D	E	F
Hundreds Tens Ones 1 3 4 5 +6 2 8 9 7 3	2 534 26 19 +107 686	Hundreds Tens Ones 1 4 7 3 +2 9 5 7 6 8	3 492 195 80 +161 928	Hundreds Tens Ones 1 1 4 5 7 +3 8 9 8 4 6	3 2 249 197 285 +174 905

2. In Ex. A, the sum of the ones is _?_. We write the 3 in one's place in the sum and then add the 1 ten with the other tens. We say that we **carry 1 ten.**

3. In Ex. B we carry _?_ tens. Why?

4. In Ex. C the sum of the tens is _?_. We write the 6 in ten's place in the sum and **carry 1 hundred.**

5. In Ex. D, why do we have 3 hundreds to carry?

6. In Ex. E and F tell what you think in adding each column.

[W]

Copy and add. Think the carried number without writing it.

	a	b	c	d	e	f
7.	675 +309	196 +782	374 +258	673 +127	86 +542	632 +98
8.	729 15 238 +16	293 72 380 +54	87 589 175 +90	274 168 207 +193	9 37 486 +97	186 259 98 +179

▶ **Extra Practice.** Work Sets 3 and 4 on page 306.

Help with Harder Addition

[O]

1. In Ex. A and B, the addends are larger than the addends on page 11 but the steps are the same. Try to explain each step.

Carrying Thousands		Adding Money Numbers		
A	B	C	D	E
Ten thousands Thousands Hundreds Tens Ones			Hundreds Tens Ones Dimes Cents	
1	2 2 3 2	1 2		
	12,967	$1.56		$175.86
	29,585	0.09		0.09
6,5 3 1	9,369	0.37	$2 6.3 9	26.15
+8,9 4 5	+17,583	+4.00	+7 8.8 7	+148.00
1 5,4 7 6	69,504	$6.02	$1 0 5.2 6	$350.10

2. In Ex. A, why aren't there any tens or hundreds to carry? The sum of the hundreds is _?_. We write the 4 in hundred's place of the sum and carry _?_ thousand.

3. In Ex. B, tell what you think in adding each column. Show how the carried numbers were obtained.

4. Read the addends in Ex. C. The dot in these money numbers is called the cent point, or the **decimal point.** What do the two places at the right of the decimal point show?

5. Why is 0 written at the left of the decimal point in money numbers like $0.37? Tell how to write 37 cents another way.

6. In Ex. D and E above, tell what numbers were carried.

[W]

On folded paper write just the sums for these examples:

	a	b	c	d	e
7.	7,895	$8.35	3,472	$16.50	75,629
	379	0.56	960	2.97	4,759
	4,867	2.94	1,598	0.86	738
	+43	+0.06	+375	+39.00	+2,497

Extra Practice. Work Sets 5 and 6.

Counting and Adding Money

[O]

1. After Jack sold his magazines, he had these bills and coins:

a $5 bill
a $1 bill
a half dollar
3 dimes
a nickel

What was the total amount? Count toy money if you need help.

2. Tell how much money each has:

Tom	**Bob**	**Sam**
A $5 bill	Two $1 bills	Six $1 bills
2 quarters	4 half dollars	7 quarters
3 dimes	1 quarter	5 dimes
4 nickels	4 dimes	4 cents

3. Without adding, tell which sums must be wrong and why.

a. 602 + 386 + 246 = 596

b. 7,842 + 39 + 837 = $87.18

c. $9.56 + $7.84 + $0.98 = $18.38

d. $39.42 + $7.65 + $45.18 = $40.25

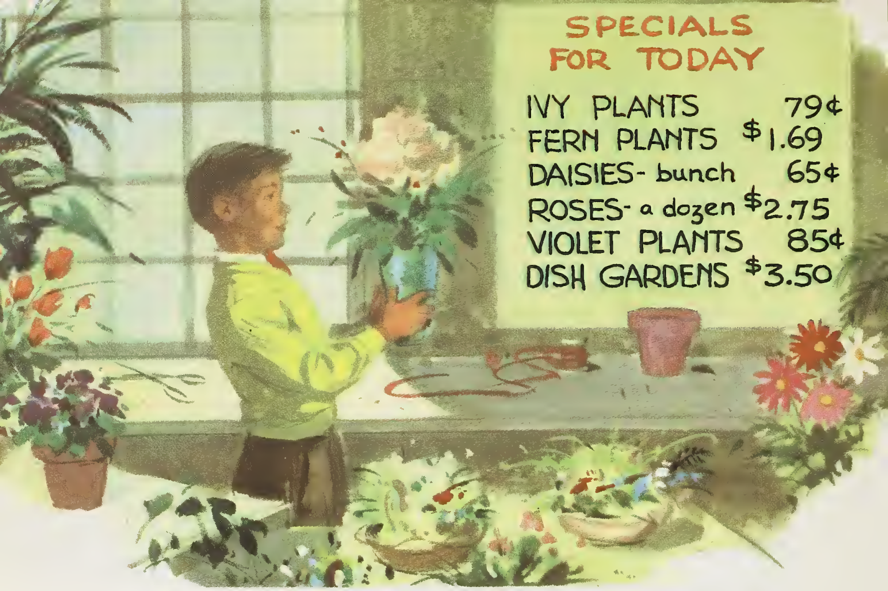
4. Which examples below are not written correctly? Why?

a	**b**	**c**	**d**	**e**	**f**
6,793	$5.67	4,896	$48.67	59	88,756
85	0.36	57	.08	425	4,259
26	9.00	8	0.39	87	378
+347	+0.59	+397	+.95	+896	+6,894

[W]

5. Copy and work correctly Ex. 3 and 4 above.

Extra Practice. Work Set 8.



Tom Helps in his Father's Flower Shop

Problem-solving; using a price list [W]

1. Tom sold a dozen roses and an ivy plant. How much did he charge the customer?

2. How much should Tom charge for a violet plant and a bunch of daisies?

3. A plant stand sells for $1.80 more than a dish garden. How much does a plant stand sell for?

4. An ivy plant sells for 25¢ less than a flower bowl. What is the price of a flower bowl?

5. Jane has $5. Can she buy a dish garden and a dozen roses?

6. After Tom's father sold 37 ferns, he still had 14 left. How many ferns had there been in all?

7. On Friday, Tom took in $46.50. This was $7.84 less than he took in on Saturday. How much did he take in on Saturday?

8. Make up 5 other problems using the price list.

Earning and Spending Money

Formulating problem questions for addition [W]

Write a question which will make each story below into an addition problem. Do the work to answer your questions.

1. Peggy was paid 35¢ for cleaning the silver, 28¢ for dusting, and 16¢ for washing the dishes.

2. Bob earned $1.75 spading the garden, a half dollar for washing the car, and a quarter for cleaning the garage.

3. Bob's father spent $1.78 for a rake and $3.95 for a shovel.

4. Betty received these coins in change: 3 cents, a nickel, a quarter, and a half dollar.

5. Betty's mother bought these things: a sweater for $5.37, a scarf for 98¢, shoes for $12.50, and a hat for $5.00.

To Keep in Practice

[W]

1. Write on folded paper the sums for Ex. a to f below.

a	b	c	d	e	f
867	7,854	$5.18	$18.79	19,975	$986.75
543	2,968	7.96	46.32	3,100	249.28
298	9,459	4.87	74.56	48,862	308.67
+716	+1,073	+8.09	+27.85	+7,034	+654.29

2. In Ex. 1, round each addend in

a. Ex. a to the nearest hundred.

b. Ex. b to the nearest thousand.

c. Ex. c to the nearest dollar.

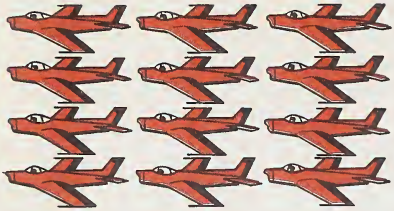
d. Ex. d to the nearest $10.

3. Write numbers 100 larger than each addend in Ex. b.

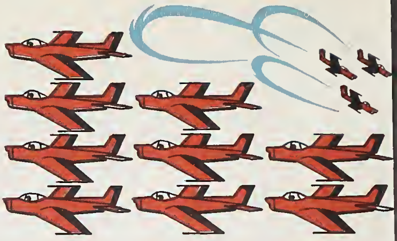
4. Write numbers 2,000 larger than each addend in Ex. e.

5. Write numbers $10 larger than each addend in Ex. f.

6. Copy and add: 9,675 + 49,867 + 38,097 + 5,629.



B



What Subtraction Does

Meaning; remainder idea [O]

1. How many planes are in picture A? What has happened in picture B? How many planes are left in the large group?

Two ways to write the number record are given in box C. Both may be read in any of these three ways:

12 minus 3 equals 9 12 less 3 is 9 3 from 12 leaves 9

C

12 *minuend*
−3 *subtrahend*
9 *remainder*

12 − 3 = 9

2. What do we call the number subtracted from? the number subtracted? the answer?

3. Draw 11 circles on the board. Then ask one of the children to look away. Erase some circles, leaving 7. Have the child tell how many circles are gone.

In Ex. 1, we subtracted to find the number left and in Ex. 3, we subtracted to find the number gone.

In a subtraction problem, the larger number given can be thought of as the sum of two smaller numbers. When we know one of the smaller numbers, we can find the other by subtracting.

Act out the following subtractions and write the subtraction fact for each problem on the board.

4. Put 16 pencils in a box. Give enough away to leave only 7 pencils. You gave away _?_ pencils.

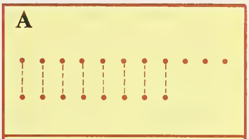
5. Start with 17¢ and spend 9¢. You have _?_¢ left.

6. How many more pumpkins have faces than have no faces?

To find out, match each pumpkin without a face against a pumpkin with a face. The dot picture in box A shows one way to compare the two groups.

To subtract, think of 11 as the sum of two groups. One group, 8, stands for pumpkins without faces. To find the other group, subtract as in box B. The difference is _?_

A



B

$$\begin{array}{rl} 11 & \textit{minuend} \\ -8 & \textit{subtrahend} \\ \hline 3 & \textit{difference} \end{array}$$

Here are other ways to ask comparison questions:

How many fewer pumpkins have no faces than have faces?

What is the difference between the number of pumpkins with faces and the number without faces?

How many more pumpkins without faces are needed to equal the number with faces?

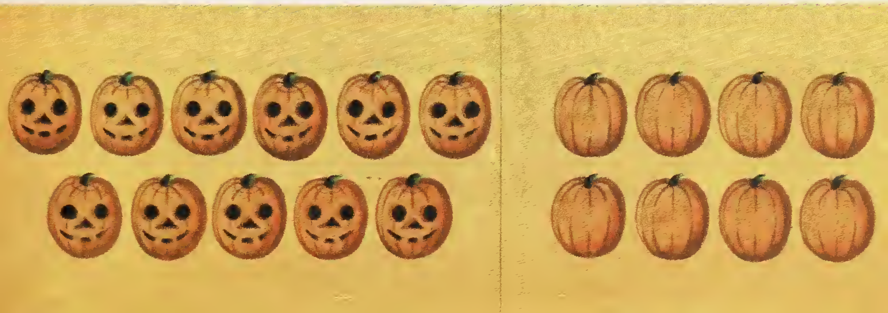
For Ex. 7–9, ask a comparison, or difference, question in three ways. Write on the board the example you must work.

7. Tom has 32¢ in his bank. Jim has 48¢.

8. There are 38 children in a room and only 26 books.

9. Jean read 24 pages and Mary read 39.

Subtraction helps us to compare two numbers. By subtracting the smaller number from the larger, we find the difference between the two numbers.



How Well Do You Know the Subtraction Facts?

Inventory Test 4 [W]

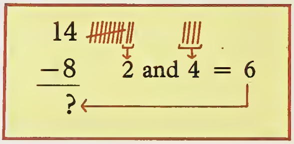
Write only the answers on folded paper.

	a	b	c	d	e	f	g	h	i	j
1.	7 −3	9 −5	8 −6	10 −2	12 −6	12 −3	10 −7	11 −2	10 −6	17 −9
2.	17 −8	15 −8	11 −6	12 −9	11 −5	11 −7	14 −5	10 −5	12 −4	9 −7
3.	11 −4	15 −9	11 −8	12 −7	13 −5	14 −6	12 −5	15 −6	13 −9	11 −3
4.	14 −7	13 −8	10 −3	16 −7	10 −4	13 −7	14 −9	13 −4	15 −7	16 −9

Make study cards for facts you missed.

Helps in Learning Subtraction

[O]



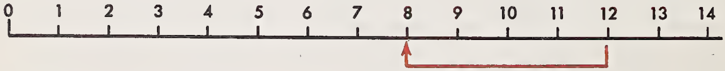
1. Subtracting a number from an equal number leaves 0. 6 − 6 = ?

2. Taking zero from a number leaves the number.

3. To subtract from a teen number, first subtract from 10. For 8 from 14, as in the box above, *think* "8 from 10 is 2. Then the 2 and the other 4 ones make 6, so 8 from 14 is _?_."

4. Whole stories in addition and subtraction are helpers, too. 8 + 4 = 12, so 4 + 8 = ? 12 − 8 = ? 12 − 4 = ?

The number line below shows how these facts are related. To subtract 4 from 12 on the line, count 4 spaces to the left of 12. 4 from 12 is _?_.



Can You Subtract by Using Families?

Inventory Test 5 [W]

On folded paper write remainders only.

	a	b	c	d
1.	23 – 5	34 minus 7	21 less 8	6 from 22
2.	32 – 4	60 minus 5	53 less 7	4 from 41
3.	51 – 7	43 minus 9	38 less 7	3 from 61
4.	20 – 8	85 minus 7	43 less 6	4 from 70
5.	45 – 9	32 minus 8	92 less 5	7 from 52
6.	61 – 5	25 minus 3	62 less 3	2 from 35
7.	89 – 7	96 minus 8	71 less 6	6 from 80

Helps in Subtracting by Families

[O]

1. The two kinds of subtraction families are shown below in boxes A and B. Explain the two kinds of subtraction families.

A

$$\begin{array}{rrrrr} 6 & 36 & 76 & 56 & 86 \\ -2 & -2 & -2 & -2 & -2 \\ \hline 4 & 34 & 74 & 54 & 84 \end{array}$$

You can subtract the ones.

B

$$\begin{array}{rrrrr} 13 & 43 & 93 & 23 & 63 \\ -6 & -6 & -6 & -6 & -6 \\ \hline 7 & 37 & 87 & 17 & 57 \end{array}$$

There are not enough ones to subtract from.

2. For each box tell 3 other examples in the same family.

Say the remainders for Ex. 3 to 10 below. Name each family.

3. 8 – 5
28 – 5
58 – 5

4. 20 – 7
60 – 7
80 – 7

5. 32 – 8
52 – 8
92 – 8

6. 13 – 6
53 – 6
73 – 6

7. 42 – 4
62 – 4
92 – 4

8. 24 – 5
64 – 5
84 – 5

9. 53 – 5
73 – 5
93 – 5

10. 34 – 9
54 – 9
74 – 9

Things to Remember about Subtraction

General Ideas [O]

Do you remember these helps for subtracting numbers?

a. Be sure to write the smaller number under the larger number with ones under ones, tens under tens, and so on.

b. Subtract ones, then tens, then hundreds, and so on.

c. If you cannot subtract in any column, borrow from the next figure to the left. To get more ones, borrow 1 ten and change it to 10 ones. To get more tens, borrow 1 hundred and change it to 10 tens, and so on.

d. Make smaller by 1 the figure from which you borrow.

e. To subtract quickly, just think the changes in the minuend.

f. To check, see whether the remainder, or difference, added to the subtrahend equals the minuend.

$$\begin{array}{r} 506 \\ -139 \\ \hline 367 \end{array} \qquad \begin{array}{r} \text{Check} \\ 367 \\ +139 \\ \hline 506 \end{array}$$

The key to success in subtracting is to learn the subtraction facts perfectly and to know when to borrow and how to borrow correctly.

How Well Can You Borrow in Subtraction?

Inventory Test 6 [W]

Copy the numbers and subtract.

1. $\begin{array}{r} 245 \\ -139 \\ \hline \end{array}$ **2.** $\begin{array}{r} \$3.04 \\ -0.94 \\ \hline \end{array}$ **3.** $\begin{array}{r} 816 \\ -249 \\ \hline \end{array}$ **4.** $\begin{array}{r} \$7.00 \\ -0.59 \\ \hline \end{array}$ **5.** $\begin{array}{r} 804 \\ -695 \\ \hline \end{array}$

6. $\begin{array}{r} 5,379 \\ -1,825 \\ \hline \end{array}$ **7.** $\begin{array}{r} \$31.70 \\ -8.92 \\ \hline \end{array}$ **8.** $\begin{array}{r} 5,013 \\ -2,478 \\ \hline \end{array}$ **9.** $\begin{array}{r} 8,162 \\ -978 \\ \hline \end{array}$ **10.** $\begin{array}{r} \$60.00 \\ -47.54 \\ \hline \end{array}$

11. \$8.32 minus \$0.98 = ? **12.** Subtract \$18.36 from \$25.00.

If this work was hard for you, study the helps on pages 21 and 22. Then take this test again.

Helps for Borrowing in Subtraction

[O]

1. Ex. A to E are the kinds of subtraction you had in Grade 4. Try to explain each example before getting help from Ex. 2–6.

Borrowing a Ten	Borrowing a Hundred	Borrowing both a Ten and a Hundred		Working with Zeros	
A	B	C		D	E
Hundreds Tens Ones	Hundreds Tens Ones	*Step* 1	*Step* 1 *and* *Step* 2	Hundreds Tens Ones	Hundreds Tens Ones
6 ⑫	4 ⑬	3 ⑫	7 ⑬⑫	4 ⑩⑫	5 9 ⑩
$9\cancel{7}\cancel{2}$	$\cancel{5}\cancel{3}9$	$8\cancel{4}\cancel{2}$	$\cancel{8}\cancel{4}\cancel{2}$	$\cancel{5}\cancel{1}\cancel{2}$	$\cancel{6}\cancel{0}\cancel{0}$
−157	−168	−195	−195	−328	−257
815	371	7	?47	184	343

2. In Ex. A there are only 2 ones in the minuend. To subtract 7, we must get more ones. Use, or **borrow,** 1 of the 7 tens, leaving _?_ tens. The 1 ten (10 ones) borrowed and 2 ones are 12 ones. Can we take 7 ones from 12 ones? Can we take 5 tens from 6 tens? 1 hundred from 9 hundreds = ?

3. In Ex. B, why can we subtract ones without borrowing? There are only 3 tens in the minuend, so to subtract 6 tens, we must get more tens by borrowing 1 hundred (10 tens). Then we have 4 hundreds and _?_ tens. 6 tens from 13 tens = ? 1 hundred from 4 hundreds = ?

4. In Ex. C, Step 1 is like the borrowing of a ten in Ex. A. Step 2 is like Ex. B. Explain and finish the subtracting.

5. In Ex. D, after 1 ten is borrowed, no tens are left in the minuend, so we must borrow 1 hundred, or _?_ tens.

6. In Ex. E, to borrow a ten, we think of 600 as 60 tens. When we borrow 1 ten, we leave 59 tens. Then we can *think*, "7 from 10 = ?   5 from 9 = ?   2 from 5 = ?"

[W]

▶ **Extra Practice.** Work Sets 10 and 11.

Help with Harder Subtraction

[O]

1. From what you know about borrowing tens and hundreds, try to explain the work in Ex. A to E. Then do Ex. 2 to 6.

Borrowing a Thousand	Borrowing Three Times	Subtracting Money Numbers		
A	**B**	**C**	**D**	**E**
$\overset{6}{\cancel{7}},\overset{⑭}{\cancel{4}}79$ $-3,869$ $3,610$	$4,235$ $-2,986$ $1,249$	$\$\overset{6\ 9}{\cancel{7.0}}\overset{⑭}{\cancel{4}}$ -0.56 $\$6.48$	$\$90.24$ -38.75 $\$51.49$	$\$901.00$ -216.79 $\$684.21$

2. Hal worked Ex. A. Did he borrow to get more ones? more tens? more hundreds? He borrowed 1 thousand (10 hundreds) to make _?_ hundreds. Explain Hal's subtraction.

3. For Ex. B, Jim worked this way: → Tell how he got the numbers from which he subtracted (the red minuends).

Jim just thought the changes because it is quicker. Can you?

6 from 15 = 9
8 from 12 = 4
9 from 11 = 2
2 from 3 = 1

4. Ann thought of Ex. C as 704 – 56. She changed 704 to 69 tens and 14 ones before she subtracted 56. Why did she do this? How did she make the remainder a money number?

5. Say the subtraction in Ex. D. Begin: 5 from 14 = 9.

6. Work Ex. E on the board and show the borrowing.

Tell what the mistakes are in Ex. 7–11.

7. 9,351	8. \$42.56	9. 70,003	10. \$180.62	11. \$600.00
–897	–19.75	–52,849	–94.87	–139.24
8,464	\$ 33.71	17,264	\$185.75	\$461.76

[W]

12. Copy and work Ex. 7–11. Do *not* show borrowing.

Extra Practice. Work Sets 15 and 16.

Make Your Own Problems!

Formulating problem questions for subtraction [W]

Write a question which will make each story into a subtraction problem. Do the work to answer your questions.

1. Steve bought 500 stamps to put in his stamp album. Steve now has 1,242 stamps.

2. Last year, 289 of the 365 days were sunny.

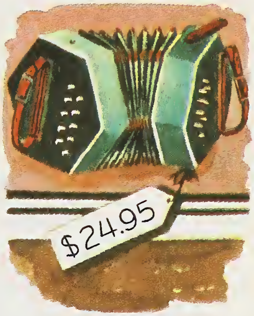
3. At a sale, a $7.50 pair of shoes was marked $4.95.

4. Mike's father raised 580 bushels of potatoes and sold 375 bushels.

5. Mr. Ely saw a refrigerator priced $235 and another, the same size, for $198.

6. Mrs. White has $7.56 in her bag. Some sheets were advertised for $8.94.

7. Ralph has saved $15.29 to buy the concertina in the picture.



Watch the Signs!

A. and S. [W]

Copy and write the answers on your paper.

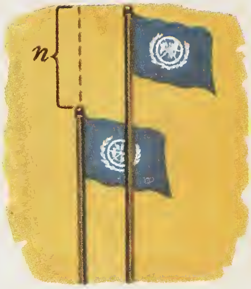
	a	b	c	d	e	f
1.	736 +166	5,024 +9,215	6,372 −987	5,442 −4,767	4,682 +3,372	$78.69 −28.73
2.	227 +475	9,016 −2,475	6,887 +6,519	8,685 −7,693	914 +259	$82.31 −44.66
3.	789 +597	9,408 −8,904	4,276 +4,383	349 +653	6,017 −535	$955.22 −57.60
4.	3,054 +5,912	5,896 −5,326	26,680 −8,468	7,904 +6,401	758 +894	$205.97 −89.62

5. 836 + 7,678 + 4,606 + 3,477

6. 77,988 from 96,424

Drawings Help in Making Comparisons

Finding the difference **[O]**

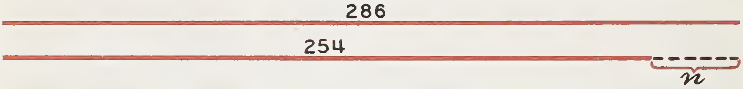


1. One flagpole measures 25 feet. The other flagpole is 39 feet tall. How much shorter is the short pole?

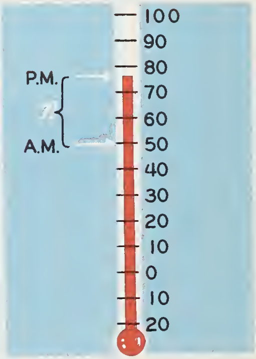
Which flagpole stands for 39 feet? which for 25 feet? How is the difference shown? Call this distance, *n*

Think of 39 as the sum. One part is 25; the other, *n*. How do we find *n*?

2. Jim and his family took a trip. They drove 254 miles going and 286 miles returning another way. How much farther did they drive one way than the other? Explain the drawing.



3. One morning the temperature was 49 degrees. At 2 P.M. it went up to 76 degrees. How many degrees warmer was it at 2 P.M.? Ask another question about these temperatures.



4. Fred took a train trip of 250 miles. When he had gone 180 miles, how many miles farther did he have to go? For help, make a drawing on the board.

5. Fred weighs 59 pounds. His father weighs 185 pounds. How much heavier than Fred is his father? Make a drawing.

6. Make 5 other problems using these "comparison words."

taller	*warmer*	*farther*	*higher*	*heavier*
shorter	*colder*	*nearer*	*lower*	*lighter*

We find the difference between two numbers by subtracting.

Finding n, the Missing Addend

[O]

1. In the drawings on page 24, did n stand for the part we had to find? The letter n can stand for any missing number.

2. What is n in each example in box A? How is n found?

A	B	C	D
$8 + n = 17$ $n + 7 = 13$ $13 = n + 8$ $16 = 9 + n$	$\begin{array}{r} 54 \\ +38 \\ \hline 92 \end{array}$	$92 = n + 38$ $\begin{array}{r} 92 \\ -38 \\ \hline 54 \end{array}$ To find n, take 38 from _?_. $n = ?$	$92 = 54 + n$ $\begin{array}{r} 92 \\ -54 \\ \hline 38 \end{array}$ To find n, take 54 from _?_. $n = ?$

3. In box B, 92 is the sum of what two addends? How is the same example written differently in boxes C and D?

4. In boxes C and D, what process is used to find n, the missing addend? What is n in box C? in box D?

When we know the sum of two addends and we know one of the addends, we subtract to find the other addend.

[W]

Find n in Ex. 5 to 13. Work as in boxes C and D.

5. $n + 36 = 75$
6. $19 + n = 81$
7. $n + 67 = 92$
8. $875 = 266 + n$
9. $206 = n + 184$
10. $462 = 159 + n$
11. $n + 160 = 902$
12. $75 + n = 318$
13. $283 + n = 450$

How Well Can You Follow Directions?

Words denoting the process in A. and S. [W]

Decide on the process. Then copy, work, and check.

1. 882 minus 479 = ?
2. 684 and 956 = ?
3. 950 minus 786 = ?
4. 8,675 plus 1,489 = ?
5. $17.84 + $3.92 + $0.67 = ?
6. $17.40 less $14.96 = ?
7. Take 486 from 904.
8. $30.03 − $9.47 = ?

Extra Practice. Work Set 18.

Making Change

[O]

1. Sally bought a 69¢ tie for her father and paid for it with a $1 bill. The clerk gave a cent, a nickel, and a quarter in change. Tell how he counted the change.

2. Sue gave the clerk $5 for a $3.40 scarf. The clerk counted the change, "$3.40, $3.50, $4, $5." What coins and bills did Sue receive?

3. Use toy money and count the change for these purchases:

	Spent	Gave Clerk		Spent	Gave Clerk
a.	6¢	a half dollar	**d.**	$1.64	$2
b.	13¢	a dollar	**e.**	$3.47	$5
c.	36¢	$1	**f.**	$1.58	$5

[W]

Extra Practice. Work Set 17.

Finding n, the Missing Minuend

[O]

1. What is *n* in each example in box A? How is *n* found?

A	B	C	D
n − 8 = 9 7 = n − 5 n − 6 = 8 4 = n − 7	$\begin{array}{r}65\\-37\\\hline 28\end{array}$ Check $\begin{array}{r}28\\+37\\\hline 65\end{array}$	n − 37 = 28 n = ? $\begin{array}{r}28\\+37\\\hline 65\end{array}$	n − 48 = 37 56 = n − 64 n − 93 = 45 87 = n − 32

2. In Ex. B what is the minuend? How is Ex. B checked?

3. In Ex. C, how do we find *n*, the missing minuend?

4. On the board, find *n* for each example in box D.

When we know the number subtracted and the remainder, we add to find the missing minuend.

[W]

Find *n*: 5. 298 = n − 43 6. n − $3.45 = $1.98

Tom Goes on a Fishing Trip

Differentiating A. and S. [W]

Before you work each problem, think whether you are to put together (add) or take apart (subtract).

1. Tom was going on a fishing trip. He bought a new fish pole for $2.98 and a line for $1.19. How much did both cost?

2. To pay for the things in Ex. 1, Tom gave the clerk $5. How much change did he get?

3. Tom and his father set out for the lake. By noon they had gone 125 miles. They still had 37 miles left to go. How far was it to the lake? Make a drawing for this problem.

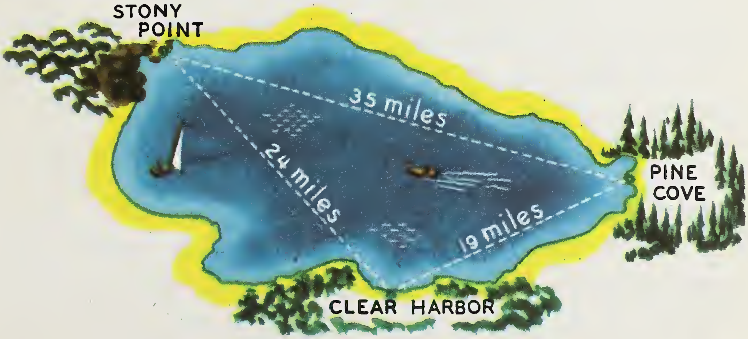
HELPER: Does "left" in this problem mean that we are to subtract?

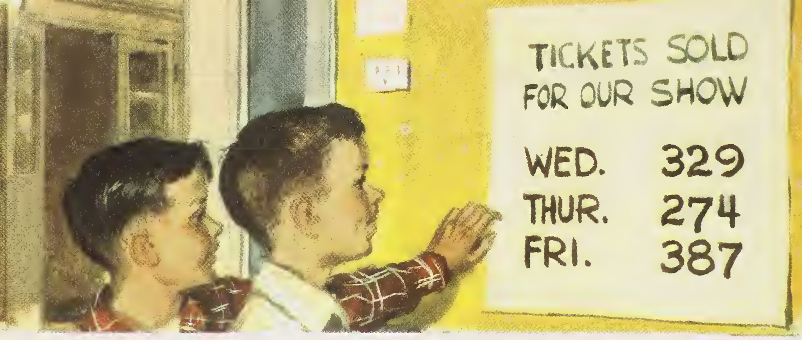
4. How many miles will Tom and his father drive in going to the lake and returning home, that is, on the "round trip"?

5. Tom caught 15 lb. of fish and his father caught 31 lb. How much less did Tom's fish weigh than his father's?

6. A motorboat travels around the lake, making stops at the towns shown on the map. What is the total distance the boat goes in making one trip around the lake?

7. How many miles shorter is the trip from Clear Harbor to Pine Cove than from Pine Cove to Stony Point?





Estimating in Addition and Subtraction

Using rounded numbers [O]

1. What does the notice on the bulletin board tell you? Joe said, "We've sold about 1,000 tickets for our show." Harry said, "How do you get that? It's about 800 tickets."

Joe thought out the total as in box A. He **estimated** the sum by adding hundreds like ones. 3 hundreds and 3 hundreds and 4 hundreds = 10 _?_.

A

329 is about 300
274 is about 300
+387 is about 400
Sum is about 1,000

Joe used **rounded numbers.** What mistake did Harry make that made him get 800?

On the board, find the exact number of tickets sold. Compare Joe's estimate with the exact sum.

2. Ames Hall seats 3,810 people. Beacon Hall seats 2,980. About how many more does Ames Hall seat than Beacon Hall?

To estimate this answer, round as in box B, and then subtract the rounded numbers. 4 thousands less 3 thousands is _?_ thousand.

B

3,810 is about 4,000
−2,980 is about 3,000
Difference is about 1,000

To get a more exact estimate, you would round only the subtrahend. Subtracting mentally, 3,810 less 3,000 = ?

On the board, find the exact difference.

Which number after each of the following examples is nearest to the exact answer? Use rounded numbers to estimate.

3. 785 + 916 + 397 = ?   1,900   3,100   2,100
4. 586 + 654 + 349 = ?   1,600   1,800   2,600
5. 896 + 358 + 257 = ?   1,800   1,500   2,400

In Ex. 5, why is it better to round 257 to 200 if you round 358 to 400?

6. 4,850 − 2,986 = ?   1,000   2,000   3,000
7. 8,740 − 2,197 = ?   7,000   5,000   4,000
8. 5,380 − 4,275 = ?   5,000   2,000   1,000

[W]

Find exact answers for Ex. 3–8.

Write estimates; then find the exact answers for Ex. 9–15.

9. Jack weighed 88 lb. last year. This year he weighs 102 lb. How many pounds has he gained?

To estimate *think*, "88 is almost 90; 102 is about _?_; _?_ minus 90 = ?"

10. In the pet show there were 18 dogs and 32 cats. How many more cats than dogs were there?

11. Ed has 24 books and his brother Bill has 19. How many books do they have together?

12. Sue has 349 buttons in her collection, and Sara has 298 buttons. Sara has how many fewer buttons than Sue?

13. Elsa has saved $6.25. How much more money does she need to save to have $9?

14. At the school picnic there were 252 boys and 248 girls. How many children were there in all?

15. Mrs. Orr bought groceries costing $3.18 and meat costing $2.85. How much did she pay altogether?

Solving Problems

Using a table [O]

THURSDAY		
Grade	**Number Enrolled**	**Number Absent**
Kindergarten	34	5
1	29	1
2	39	4
3	36	0
4	30	3
5	24	1
6	29	2

The chart at the left is called a **table.** The left column names the grades. The second column tells the number of pupils belonging to, or enrolled in, each grade. The third column tells the number absent on Thursday.

You read the top line: "In the kindergarten, 34 pupils are enrolled and 5 were absent."

1. Read the second line; the fifth line; the last line.

[W]

To find answers for Ex. 2 to 11, use the table.

2. How many pupils were enrolled in all grades?

3. How many fourth-grade pupils were present?

4. How many children from all grades were absent?

5. Which grade had perfect attendance?

6. How many pupils were enrolled in the first, second, and third grades?

7. The grade with the largest enrolment had how many more pupils than the room with the smallest enrolment?

8. How many pupils were enrolled in the fourth, fifth, and sixth grades? How many of them were absent that day?

9. Which grade had the greatest number absent?

10. Which grade had the greatest number present?

11. Make three addition problems and three subtraction problems from the table.

Do You Understand?

Test of Information and Meaning 1

A	B	C	D	E	F
8,675 924 + 56	1,642 90 304 + 8	$7.89 0.08 10.00 + 2.15	$37.20 − 40.00	8,012 − 6,997	7,856 − 284

1. Look at Ex. A, B and C above. Which example is not written in the correct way? Write it correctly. Do not add.

2. Which is the best estimate for Ex. C? $18 $19 $20

3. How many addends has Ex. A? Ex. C?

4. Look at Ex. D, E, and F above. Which one is not written in the correct way? Write it correctly. Do not subtract.

5. Which is the best estimate for Ex. E? 1,000 2,000 3,000

6. In Ex. F, do we borrow to get more ones? more tens? more hundreds?

7. Three dollars equal how many dimes? how many cents?

8. Jim has a dollar bill, 2 quarters, a dime, and a nickel. How much money has he in all?

9. Finish: $68.05; $69.05; _?_; _?_; $72.05; _?_.

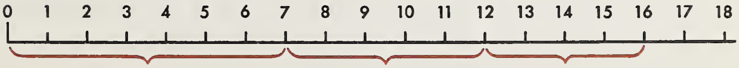
10. Write the largest 5-place number; the smallest 6-place number.

11. Write these numbers in order of size beginning with the smallest: 15,070 7,850 100,000 96,075 70,000

12. Write in Roman numerals: **a.** 15 **b.** 40 **c.** 29

13. Write in Arabic numbers: **a.** IX **b.** XXVI **c.** LX

14. Write the addition example shown on the number line.



Do You Make Mistakes?

Diagnostic Test 1

Copy and work. You need not check the answers.

	a	b	c	Study Pages	Practice Sets
1.	58 + 9	86 − 7	57 + 8 + 4	8-9, 19	
2.	824 +59	782 +96	$9.84 +3.78	11	1, 2
3.	6,782 4,397 +825	$8.73 9.86 0.54 +3.67	$86.97 74.83 9.70 +45.86	12, 13	7
4.	782 −549	$9.58 −0.75	$78.00 −23.48	21	9, 12
5.	7,298 −5,467	5,021 −1,679	$154.32 −86.57	22	13, 14

Can You Solve Problems?

Problem Test 1

1. Jim is 52 inches tall. He is 6 inches shorter than Tom. How tall is Tom?

2. When Ann went shopping she had $2.85. When she came home she had $1.40. How much had Ann spent?

3. Fred earned 95¢ for washing the car and 75¢ for cleaning the garage. For both jobs, Fred was paid $_?_.

4. Helen received $5.00 for her birthday. She spent all but $1.35 of it for a sweater. What did the sweater cost?

5. Twenty-five boys and 18 girls from the Park School took the bus to the museum. How many children took the bus?

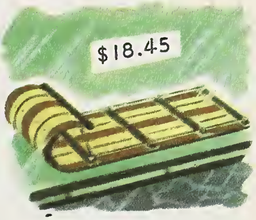
6. Fifty children from the Hunter School planned to go on a coasting party. Eight children were sick and couldn't go. How many children went?

7. Bob sold his old skates for $2.75. That was $2.20 less than he paid for them. How much had his skates cost?

8. Bob bought new larger skates for $5.39. He gave the clerk $10. How much was his change?

9. Ann's new ski suit cost $19.95. Mary's cost $23.50. How much more did Mary's suit cost than Ann's?

10. The Harris children are saving their money to buy a toboggan. Jim has $4.50; Dick, $3.86; Betty, $3.79; and Sue, $4.45. If they put all their money together, can they buy this toboggan shown in the picture?



How Well Can You Figure?

Computation Test 1

Copy and work Ex. 1–15.

1. $5.32 +1.65	2. 829 −317	3. $4.58 +0.23	4. $7.40 −7.28	5. 964 +873
6. $9.34 −6.89	7. 487 35 +954	8. 4,800 −1,367	9. 9,482 765 +78	10. $70.30 −28.56

11. 4,896 + 7,594 + 653 = ?

12. $389.15 + $4.78 + $74.16 + $8.54 = ?

13. What is the difference between $73.86 and $150.10?

14. $46.27 from $92.15 = ?   15. $600.00 minus $154.72 = ?

2

What Multiplication Does

Meaning [O]

1. What kind of party is Mary having?

2. In all, how many cupcakes did Mary put on plates?

To find the total, you can use the picture and *count;* or you can *add* as in box A; or you can *multiply* as in box B, because the groups of like-things are equal. If you know right away how many four 6's are, you do not need to count or to add.

To multiply, write the number record as a multiplication fact, as in box B or as in box C. Two ways to read this fact are:

Four 6's are 24 or 4 times 6 is 24.

× is the multiplication sign, or the times sign.

A	B	C	D
$\begin{array}{r}6\\6\\6\\\underline{+6}\end{array}$	$\begin{array}{r}6\\\underline{\times 4}\\24\end{array}$	$4 \times 6 = 24$	$\begin{array}{rl}\left.\begin{array}{rl}6 & \textit{multiplicand}\\\underline{\times 4} & \textit{multiplier}\end{array}\right\} & \textit{factors}\\\begin{array}{rl}24 & \textit{product}\end{array} & \end{array}$

3. Look at box D and read the names for the parts of any multiplication example.

6, the multiplicand, tells the size of the equal groups.

4, the multiplier, counts the equal groups. It tells how many equal groups are to be put together.

24, the product, tells how many in all, or the total.

6 and 4 are factors of the product, 24.

4. On the board, write in two multiplication ways (see boxes B and C) the facts shown by the plates of chocolate witches.

5. On the board, write these as multiplication facts in two ways:

a. 7 + 7 + 7 + 7 **b.** 9 + 9 + 9 **c.** 8 + 8 + 8 + 8 + 8

6. Name all three parts of each example you wrote for Ex. 5.

How Well Do You Know the Multiplication Facts?

Inventory Test 7 [W]

Write only the products on folded paper.

	a	b	c	d	e
1.	7 × 4	Nine 9's	6 × 9	4 times 3	9 × 1
2.	8 × 1	Five 7's	5 × 8	9 times 2	8 × 5
3.	6 × 4	Four 6's	9 × 7	5 times 6	9 × 6
4.	9 × 8	Seven 9's	4 × 5	8 times 7	5 × 2
5.	4 × 4	Six 6's	6 × 2	4 times 8	7 × 3
6.	6 × 5	Eight 2's	7 × 7	7 times 5	8 × 8
7.	7 × 8	Four 7's	4 × 9	8 times 3	9 × 5
8.	5 × 4	Five 9's	8 × 6	4 times 2	7 × 6
9.	6 × 7	Six 8's	5 × 3	5 times 5	8 × 4
10.	8 × 9	Nine 4's	7 × 2	9 times 3	6 × 3

Make study cards for facts you missed. The work on this and the next page will help you learn facts you do not know.

Helps in Learning Multiplication Facts

[O]

1. When we multiply 1 by a number, or when we multiply a number by 1, the product (answer) is the same as the number.

6 × 1 = 6   1 × 9 = 9   24 × 1 = ?   1 × 52 = ?

2. The product is not changed when the factors are reversed. Six 8's are 48, or eight 6's are 48.   7 × 9 = ?   9 × 7 = ?

3. When the multiplier is larger than 1, the product will be larger than the multiplicand. Give 5 facts to prove this.

4. Tell the answers in a to c below:

a	b	c
3 + 3 + 3 + 3 + 3 = ?	4 + 4 + 4 + 4 = ?	6 + 6 + 6 = ?
5 × 3 = ?	4 × 4 = ?	3 × 6 = ?

5. Multiplication is a short form of _?_.

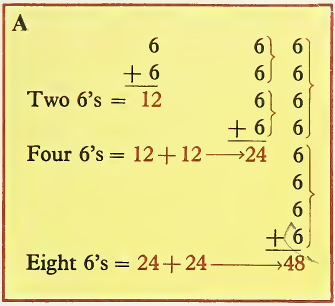
6. Use easy facts as helpers for hard facts. In box A, why is 2 × 6 (two 6's) = 12 a helping fact for 4 × 6 (four 6's) = ?

7. In box A, why is 4 × 6 = 24 a helper for 8 × 6 = ?

8. In column a below, knowing 4 × 7 = 28 helps you to know 8 × 7 = ? Use this idea of *doubling* for columns b to h.

a	b	c	d
4 × 7	4 × 9	3 × 7	3 × 8
8 × 7	8 × 9	6 × 7	6 × 8

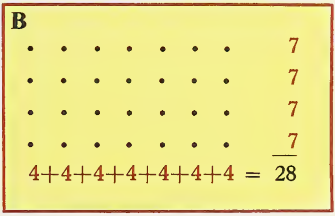
e	f	g	h
4 × 8	4 × 5	3 × 5	3 × 9
8 × 8	8 × 5	6 × 5	6 × 9



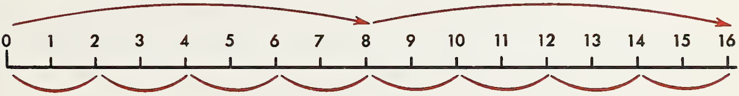
9. Explain how box B shows these related facts:

7 *multiplicand*	4 *one factor*
×4 *multiplier*	×7 *other factor*
28 *product*	28 *product*

4 × 7 is the *reverse* of 7 × 4.



10. What two related multiplication facts are shown on the number line below? What two factors of 16 are shown?



[W]

11. Draw a dot picture for each pair of facts below.

a. 4 × 9 and 9 × 4

b. 5 × 7 and 7 × 5

12. Write each of the following as multiplication facts. Name all three parts of each fact.

a. 6 + 6 + 6 + 6 + 6 + 6 + 6

b. 8 + 8 + 8 + 8 + 8 + 8

When Must We Add? When May We Multiply?

Differentiating A. and M. [O]

1. For the school games, there were 4 teams with 7 children on each team. How many children were playing?

Are we to put groups together or separate them?
Are we combining equal or unequal groups?
Should we multiply or add? Why?

2. On a park playground 18 boys were playing baseball, 8 girls were playing a circle game, and 9 children were on the swings. How many children were on the playground?

Answer the same questions for Ex. 2 that you did for Ex. 1.

For each of problems 3 to 6, tell whether you should add or multiply and explain why. Do not find answers yet.

3. Elmer paid 69¢ for a kite, 98¢ for a magnet, and $2.50 for a model airplane. How much did these things cost?

4. The children who ride to school on bicycles park them in 3 rows. If there were 15 bicycles in each row, how many would there be in all?

5. Each table in the lunchroom will seat 8 children. One day all 9 tables were filled. How many children were eating in the lunchroom that day?

6. Four boys pick up paper on the school lawn each day. One day Jim picked up 8 pieces; Tom, 12; Bob, 11; and Joe, 7. In all, how many pieces of paper did the boys pick up?

When we put together groups which are not equal to find the total, we add.

When we put together groups which are equal to find the total, we may add or we may multiply. It is usually better to multiply.

[W]

Now go back and write the work for problems 1 to 6.

Things to Remember about Multiplication

General Ideas [O]

Do you remember these helps in multiplication?

a. Use the smaller number for the multiplier (box A).

b. Multiply first ones, then tens, then hundreds, and so on.

A

Not This	This
3	48
×48	×3

c. Carry when the product in any place is 10 or more.

d. Add the carried figure to the next place only *after* you have multiplied in that place.

e. Check either by multiplying a second time or by adding.

f. When the multiplicand is a money number, put a decimal point in the product so there are two places at the right of the decimal point.

g. Learn to use correctly the words that name the parts of any multiplication example (box B).

B

$4.86	*multiplicand*
×7	*multiplier*
$34.02	*product*

The key to success in multiplication of larger numbers is to know the multiplication facts perfectly.

How Well Can You Multiply Larger Numbers?

Inventory Test 8 [W]

Copy and multiply.

1. 69 ×3	2. 400 ×8	3. $6.72 ×4	4. 937 ×5	5. $7.06 ×4
6. 2,812 ×3	7. 1,570 ×7	8. $70.20 ×5	9. 5,004 ×9	10. $76.53 ×6

11. 8 × $35.92　　12. 4,811 × 7　　13. 9020 × 5

If this work was hard for you in any way, study the helps given on pages 40–42. Then take this test again.

Multiplying Tens, Hundreds, and Thousands

[O]

1. Finish the examples in the boxes. Then tell how multiplying tens, hundreds, and thousands is like multiplying ones.

Ones	Tens	Hundreds	Thousands
3 × 8 = ?	3 × 8 tens = ? 3 × 80 = ?	3 × 8 hundreds = ? 3 × 800 = ?	3 × 8 thousands = ? 3 × 8,000 = ?

Cover each 0 in rows 2 and 3 and say the product. Then uncover the 0 and say the product.

	a	b	c	d	e
2.	3 × 90	6 × 30	4 × 70	6 × 40	9 × 50
3.	5 × 40	8 × 60	9 × 30	7 × 80	6 × 60

Say products for rows 4 and 5 in two ways. For 4a say, "Five 300's are 15 hundreds, or 1 thousand 5 hundred."

4.	5 × 300	4 × 300	6 × 300	8 × 300	9 × 200
5.	7 × 900	8 × 400	5 × 500	4 × 400	7 × 700

Say products for rows 6 and 7. **Helper.** Cover zeros first.

6.	5 × 7,000	7 × 9,000	5 × 9,000	8 × 6,000	6 × 5,000
7.	8 × 8,000	4 × 7,000	9 × 6,000	2 × 8,000	7 × 8,000

[W]

Copy the examples and write products for rows 2 to 7 above.

To check products in row 8, copy and work each example.

	a	b	c	d	e	f
8.	4,000 ×7 28,000	900 ×8 72,000	60 ×7 420	400 ×6 2,400	8,000 ×5 4,000	500 ×7 3,500

Copy and work the examples in row 9.

9.	800 ×7	5,000 ×8	90 ×7	600 ×5	4,000 ×8	70 ×6

Helps for Carrying in Multiplication

[O]

1. Try to explain Ex. A to F before you read the helps below:

Carrying Tens		Carrying Hundreds		Carrying both Tens and Hundreds	
A	B	C	D	E	F
Tens Ones		Hundreds Tens Ones		Hundreds Tens Ones	
29	248	192	371	368	759
×3	×2	×4	×5	×7	×8
87	496	768	1,855	2,576	6,072

2. Ex. A. **Ones:** 3 × 9 = 27 (2 tens and 7 ones). Write "7" in one's place and carry 2 (tens). **Tens:** 3 × 2 = 6. Add the 2 tens carried, making _?_ tens. Write _?_ in ten's place.

3. Explain Ex. B. Check by adding two 248's.

4. Ex. C. **Ones:** Why is 8 the one's figure in the product? **Tens:** 4 × 9 = ? 36 tens = 3 hundreds and 6 tens. Write "6" for the ten's figure and carry 3 _?_. **Hundreds:** Multiply as usual and add the carried 3. What do you write?

5. As you did for Ex. C, explain the work for Ex. D. How could the product be checked?

6. In Ex. E, how many tens are carried? How many hundreds? Explain all the work for Ex. E and F.

[W]

Copy and multiply. Check by multiplying again.

	a	b	c	d	e	f
7.	48 ×4	75 ×6	92 ×3	861 ×7	600 ×9	382 ×8
8.	87 ×6	45 ×8	60 ×8	753 ×3	947 ×8	653 ×7

Extra Practice. Work Sets 19 and 20.

Help with Harder Multiplication Examples

[O]

1. Try to explain Ex. A to E before you read the helps below.

Carrying Thousands	Multiplying Zeros		Multiplying Money Numbers	
A	B	C	D	E
1,921 ×4 7,684	6,050 ×7 42,350	7,008 ×9 63,072	$3.56 ×9 $32.04	$16.93 ×7 $118.51

2. Ex. A. Multiply ones and tens in the usual way.
Hundreds: 4 × 9 = ? Write "6" and carry 3 thousands.
Thousands: 4 × 1 = 4. 4 and 3 (carried) = ? What do we write in thousand's place?

3. Ex. B and C. These multiplications are easy if you remember that the product of any number and zero is always zero.

4. Ex. D and E. Both products mean dollars and cents, so we show two places at the right of the decimal point for cents.

Each example in row 5 has a mistake. Tell where each mistake is. Then work these examples correctly on the board:

	a	b	c	d	e
5.	8,967 ×5 40,835	7,058 ×8 56,404	9,004 ×7 6,328	$7.84 ×5 $3920	$48.32 ×9 $43.788

[W]

	a	b	c	d
6. Multiply by 6:	879	7,005	8,972	$0.97
7. Multiply by 8:	900	8,700	6,040	$3.45
8. Multiply by 9:	765	4,823	9,700	$15.04
9. Multiply by 7:	247	8,070	6,009	$35.98
10. Multiply by 5:	604	3,050	7,200	$22.08

➤ **Extra Practice.** Work Set 22.

Shopping for Food

Formulating A., S., or M. questions [W]

Write a question to make an addition, subtraction, or multiplication problem. Do the work to answer your questions.

Remember: We add or multiply to find a total. We subtract to find a remainder or a difference.

1. Jane bought 3 pounds of meat at 87¢ a pound.

2. Mary paid $3.87 for meat and 95¢ for potatoes.

3. Ann bought a cake for 67¢. She gave the clerk $1.

4. After Jim had shopped, he had 89¢ left from $4.50.

5. Jack bought 4 boxes of cookies, with 18 in a box.

6. Helen spent $2.19 for meat, 86¢ for vegetables, 75¢ for a cake, and 54¢ for milk and cream.

Can You Find the Mistakes?

[W]

Write correctly the three examples in row 1 which are not now written correctly. Then find all the remainders.

	a	b	c	d	e	f
1.	$3.26 −.98	2,056 −4,897	4,009 −869	$18.75 −31.00	$16.20 −8.74	6,000 −5,143

2. Without doing the work, find one thing wrong about each answer below. Write the answer correctly. Check your work.

a. 9 × $2.30 = $2,070

b. 7 × $60 = $4.20

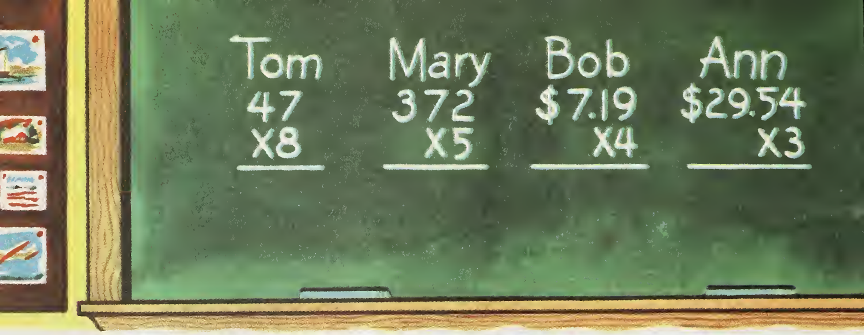
c. 6 × 840 = $50.40

d. $8.96 − $2.28 = $668

e. 7,810 − 2,654 = $51.56

f. $32.13 − $18.96 = 1,317

Extra Practice. Work Set 24.



Estimating Products

Using rounded numbers [O]

The children whose work is begun on the board want to estimate before they find the exact products.

1. Should Tom *think*, “8 × 40” or “8 × 50”? Why?

2. Should Mary *think*, “5 × 300” or “5 × 400”? Explain.

3. Will Bob’s estimate be closer to the correct answer if he *thinks*, “4 × $7 = $28” or “4 × $8 = $32”? Explain.

4. Should Ann *think*, “3 × $20” or “3 × $30”? Why?

Tell which of the three numbers given after each example below is nearest the exact product. Tell why.

5.	8 × 59	400	480	560
6.	7 × 87	560	720	630
7.	3 × $62	$180	$210	$240
8.	9 × $0.38	$2.70	$3.60	$4.50
9.	6 × 439	2,400	3,000	3,600
10.	4 × 694	2,400	2,800	3,200
11.	8 × $7.16	$64	$72	$56

[W]

Find exact products for the examples in the picture and for Ex. 5 to 11.

Estimating in Multiplication Problems

[W]

First write your estimated answer. Then find the exact product for each of these problems:

1. For the waste-paper drive, Joe and Harry collected 235 lb. of old newspapers. The magazines they collected weighed 3 times as much as the newspapers, or _?_ lb.

2. It is 189 miles from Bob's house to his uncle's farm. How long is the round trip?

3. Dan counted 28 trucks and 3 times that many passenger cars. How many passenger cars did he count?

4. Sally bought 5 balls of yarn for a sweater at 69¢ a ball. What did the yarn cost her?

5. Jim weighs 109 lb. and his father weighs twice that much. Find how much Jim's father weighs.

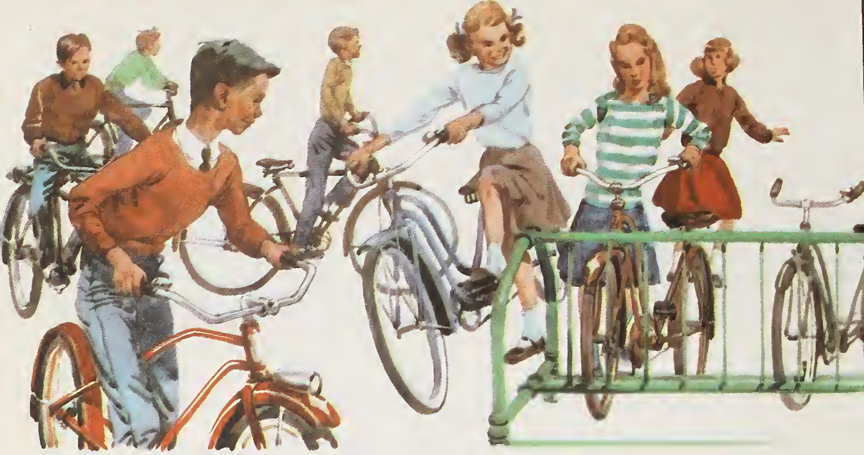
6. Sam's father is 38 yr. old and his grandfather is twice that age. How old is Sam's grandfather?

7. How much will Pete have to pay for 3 shirts which cost $2.89 each?

How Well Can You Follow Directions?

[W]

1. 78 + 26 = ?
2. 9 times 172 = ?
3. 87 more than 825 = ?
4. 65 plus 478 = ?
5. 377 minus 265 = ?
6. Seven 49's are _?_.
7. 8 times 112 equals _?_.
8. 753 less 397 equals _?_.
9. 240 and 77 are _?_.
10. 345 less than 532 = ?
11. 6 times 140 = ?
12. $11.01 is _?_ more than $9.
13. 306 multiplied by 5 = ?
14. Three 75's are _?_.
15. 90 added to 81 makes _?_.
16. $10.75 multiplied by 6 = ?
17. 94 less than 183 is _?_.
18. 595 minus 88 equals _?_.



The Bicycle Club

Problems without numbers [O]

1. If you know the number of children in the Bicycle Club, and how many are boys, how can you find the number of girls?

Use the picture to find the needed numbers.

Tell how you would solve problems 2 to 7 if they had the numbers in them.

2. For a week-end bicycle trip, the children each paid the same amount of money. What was the entire cost of the trip?

3. Some of the Club members have already taken the road-safety test. How many members have not yet taken the test?

4. Bill bought a new tire and a new bell. The tire cost how much more than the bell?

5. When Pete bought a secondhand bicycle, he had to buy a new tire. How much did the bicycle and new tire cost together?

6. Tom rode to Jerry's house. Then they both rode to school. How far did Tom ride?

7. The parking stand has space for twice as many bicycles as are ridden to school. How many bicycles will it hold?

The School Paper

Using data from previous problems [W]

In these problems you may have to answer more than one question and use numbers from problems already solved.

1. The members of a fifth-grade class printed 48 copies of the first issue of their school paper. Each copy had 3 sheets of paper. They printed 96 copies of the second issue, each with 4 sheets. How many sheets of paper were used for each issue?

2. How many sheets of paper were used in printing all the copies of both issues of the school paper?

3. For the first issue, 3 children wrote stories, 4 wrote reports, 17 wrote other articles, and 5 drew pictures. How many children contributed something to the first issue?

4. In all, 37 children wrote or drew pictures for the second issue. How many more or how many less was this than the number who wrote or drew pictures for the first issue?

5. How much would the fifth-grade class have made if 5¢ had been charged for each of the 48 copies of the first issue?

6. One time Kate had 150 copies of the school paper to deliver. She gave one room 29 copies, another 36, another 27, and another 35 copies. How many copies did she deliver in all? How many copies did she have left?

Mixed Practice

[W]

	a	b	c
1. From 9,231 subtract:	896	7,548	8,395
2. From 60,000 subtract:	654	9,321	58,683
3. Add 8,396 to:	274	6,395	76,294
4. Multiply by 8:	619	905	4,376
5. Multiply by 9:	607	783	9,462

6. Add all the numbers in column a; in b; in c.

What Division Does

Meaning; measurement D. [O]

1. Ann's box had 24 roses in it. She decided to put them into bouquets of 8 each. How many bouquets can Ann make?

To find how many 8's in 24, you can use the picture at the right and count the number of bouquets Ann made. How many?

You can subtract 8's one at a time as in box A. There are _?_ 8's in 24.

But the best way is to divide as in box B. This is the same as subtracting as many 8's as possible *at one time.* The multiplication fact, $3 \times 8 = 24$, shows that _?_ is the largest number of 8's that we can subtract.

A

$$\begin{array}{rl} 24 & \\ -8 & (1) \\ \hline 16 & \\ -8 & (2) \\ \hline 8 & \\ -8 & (3) \\ \hline 0 & \end{array}$$

B

$$\begin{array}{rl} 3 & \\ 8\overline{)24} & \\ -24 & (3 \times 8) \\ \hline 0 & \end{array}$$

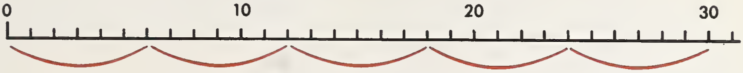
When Ann separated 24 roses into equal smaller groups of 8 each, she really measured a group of 24 like-things by 8's. Finding how many 8's in 24 is using **measurement division.**

2. At the board, use the way shown in box A or in box B to find how many bouquets of 6 roses each you can make from
18 roses; 12 roses; 24 roses; 36 roses; 42 roses.

3. There were 30 boys to run in relay races. With 6 boys to a team, how many teams will there be?

We are to measure 30 by _?_, or find how many 6's in _?_.

How does this number line help you measure 30 by 6?



This division fact is written with the frame $\overline{)}$ or with the sign ÷, as in box C. This fact may be read in any of these ways:

6's in 30 = 5.

30 divided by 6 equals 5.

6 is contained in 30 five times.

30 contains 6 five times.

C

$$\begin{array}{r} 5 \\ 6\overline{)30} \end{array} \qquad 30 \div 6 = 5$$

D

$$\begin{array}{rl} 5 & \leftarrow \textit{quotient} \\ 6\overline{)30} & \leftarrow \textit{dividend} \\ \uparrow & \\ \textit{divisor} & \end{array}$$

4. In box D, read the names for the parts of a division example.

30, the dividend, tells the size of the group to be divided, or from which the equal smaller groups are to be taken.

6, the divisor, tells the size of each equal smaller group to be taken out, or the size of the group by which 30 is measured.

5, the _?_, tells how many equal smaller groups can be made.

We divide to find how many times one group or number is contained in another group or number. This is measurement division.

[W]

Write each example another way and give the quotients. For help, use a number line or subtract as in box A (page 48).

	a	b	c	d	e	f
5.	$4\overline{)36}$	$3\overline{)15}$	$5\overline{)35}$	27 ÷ 3	32 ÷ 8	18 ÷ 6
6.	$7\overline{)21}$	$6\overline{)48}$	$7\overline{)42}$	25 ÷ 5	48 ÷ 8	28 ÷ 7
7.	$5\overline{)45}$	$7\overline{)63}$	$8\overline{)56}$	30 ÷ 6	72 ÷ 9	64 ÷ 8

Division Facts Go in Pairs

[O]

1. Tom and Jim each planted 18 bulbs. Tom planted 6 in each bowl and Jim, 3 in each bowl. How many bowls did each boy need?

2. Which boy's bulbs are shown at the left above? at the right? Which boy's division fact is shown in box A? in box B?

3. What do you notice about Tom's and Jim's division facts?

A

$$\begin{array}{r}3\\6\overline{)18}\end{array}$$

$18 \div 6 = ?$

6's in 18 = ?

B

$$\begin{array}{r}6\\3\overline{)18}\end{array}$$

$18 \div 3 = ?$

3's in 18 = ?

Division facts, like multiplication facts, go in pairs.

Write on the board the division facts for Ex. 4 to 7. For each fact, tell which number is dividend; divisor; quotient.

4. Jack planted 15 tomato plants in rows with 5 plants in each row. How many rows did he make? Make a dot picture.

5. At a picnic, 36 children were seated at tables with 9 children at each table. How many tables were used?

6 and 7. Change each problem in Ex. 4 and 5 to make it a division problem using the other fact in the pair.

[W]

Copy these examples and write quotients. Beside each, write the other division fact in the pair. Use dot pictures for help.

	a	b	c	d	e	f	g
8.	$8\overline{)32}$	$7\overline{)35}$	$9\overline{)27}$	$5\overline{)35}$	$9\overline{)45}$	$8\overline{)40}$	$6\overline{)42}$
9.	$9\overline{)36}$	$4\overline{)24}$	$8\overline{)72}$	$4\overline{)28}$	$7\overline{)56}$	$5\overline{)20}$	$6\overline{)54}$

How Well Do You Know the Even Division Facts?

Inventory Test 9 [W]

Copy the examples in rows 1 to 8 and write the quotients.

Part I (Divisors 2, 3, 4 and 5)

	a	b	c	d	e	f	g
1.	3)21	4)20	4)24	4)36	2)18	5)15	2)16
2.	5)35	3)18	4)32	5)25	4)8	3)15	5)40
3.	4)12	2)12	5)20	5)45	3)9	1)5	3)24
4.	4)28	5)30	3)27	2)14	4)16	4)4	3)12

Part II (Divisors 6, 7, 8 and 9)

	a	b	c	d	e	f	g
5.	8)72	7)35	9)36	7)42	8)32	7)56	6)54
6.	7)28	9)72	7)21	9)27	8)64	9)54	6)48
7.	7)49	8)40	6)42	9)45	8)56	7)63	6)24
8.	9)63	6)36	6)30	9)81	6)18	8)24	8)48

Make study cards for facts you missed.

Helps in Learning Division Facts

[O]

1. A number divided by 1 equals the number. $7 \div 1 = ?$

2. A number divided by an equal number equals 1. $6 \div 6 = ?$

3. Study together all facts with the same product or dividend. Say the division facts related to each of the multiplication facts at the right.

$$\left.\begin{array}{l} 3 \times 8 = \\ 8 \times 3 = \\ 4 \times 6 = \\ 6 \times 4 = \end{array}\right\} 24 \qquad \left.\begin{array}{l} 6 \times 6 = \\ 9 \times 4 = \\ 4 \times 9 = \end{array}\right\} 36$$

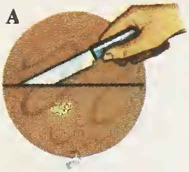
4. Whole stories in multiplication and division are helpers, too. $3 \times 4 = 12$, so $4 \times 3 = ?$ $12 \div 3 = ?$ $12 \div 4 = ?$

5. When a divisor is larger than 1, the quotient is smaller than the dividend. Give 5 examples.

Fractional Parts of a Whole

Meaning [O]

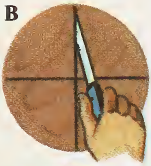
A



1. "There will be 8 people for dinner," said Sue. "I'll cut this cake into 8 equal pieces."

On the board, draw a circle for a cake. Show how Sue would cut 8 equal parts.

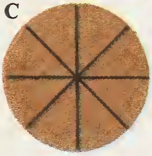
B



2. In A, the cake is being cut into _?_ equal parts. Each equal part is _?_.

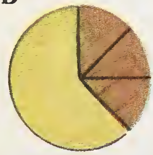
3. In B, there are _?_ equal parts. Each of the 4 equal parts is one fourth ($\frac{1}{4}$).

C



4. In C, the cake has been cut into _?_ equal parts. Each part is one eighth ($\frac{1}{8}$) of the whole cake.

D



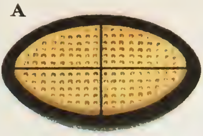
5. In a whole cake, there are _?_ halves; _?_ fourths; _?_ eighths.

$$1 = \frac{?}{2} = \frac{?}{4} = \frac{?}{8}.$$

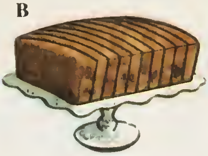
6. In D, five $\frac{1}{8}$'s, or $\frac{5}{8}$, of the cake have been served. How many one eighths were left? Write this number on the board.

Numbers like $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{5}{8}$ and $\frac{3}{8}$ are called fractions.

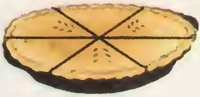
A



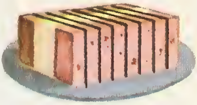
B



C



D



7. Tell the number of equal parts in each whole thing pictured on this page. Tell also the name of one of the equal parts.

For A say, "The waffle has _?_ equal parts. One of the equal parts is one fourth."

8. How can you tell what name to give to *one* of the equal parts of a whole thing?

> **The size and the name of one of the equal parts of a whole depend upon the number of equal parts there are in the whole.**

9. In circle E below, how many $\frac{1}{5}$'s (one fifths) are colored and how many $\frac{1}{5}$'s are white?

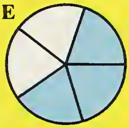
We say, "$\frac{3}{5}$ (colored) plus $\frac{2}{5}$ (white) make $\frac{5}{5}$, or 1 whole circle."

[W]

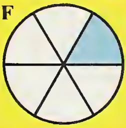
10. For each of the drawings F to I below, write fractions to name the colored part and the white part. Then draw a line and show the sum of these parts. For E, copy the work in the box.

colored	$\frac{3}{5}$
white	$+\frac{2}{5}$
sum	$\frac{5}{5} = 1$

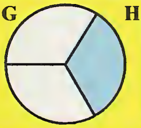
E



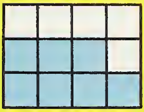
F



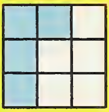
G



H



I



11. Use a pattern and draw four circles. Letter them, J, K, L and M. Divide and color or shade

a. $\frac{3}{4}$ of J; **b.** $\frac{3}{8}$ of K; **c.** $\frac{2}{3}$ of L; **d.** $\frac{5}{6}$ of M.

Names for the Parts of a Fraction

Terms [O]

1. On the board, write in figures: two fifths; two thirds; two sixths.

2. In Ex. 1, which figure in each fraction is the same?

3. Tell how many equal parts of the whole there are in $\frac{3}{5}$; in $\frac{3}{8}$; in $\frac{3}{4}$; in $\frac{3}{10}$.

4. What does the number above the fraction line tell us?

The number above the fraction line is the **numerator** (nu′-mer-a′-tor). It tells how many equal parts of the whole there are in the fraction.

5. On the board write in figures: three tenths; seven tenths; nine tenths.

6. In Ex. 5, which number in each fraction is the same?

7. Tell the name for just one part of $\frac{7}{12}$; of $\frac{5}{12}$; of $\frac{11}{12}$.

8. What does the number below the fraction line tell us?

The number below the fraction line is the **denominator** (de-nom′-in-a′-tor). It tells the number of equal parts in the whole. The fraction which names one of these equal parts also tells the size of one of the equal parts.

The numerator and the denominator are the **terms** of the fraction.

$$\left.\begin{array}{c} 3 \\ \hline 8 \end{array}\begin{array}{l} \rightarrow \textit{numerator} \\ \rightarrow \textit{denominator} \end{array}\right\}\ \textit{terms}$$

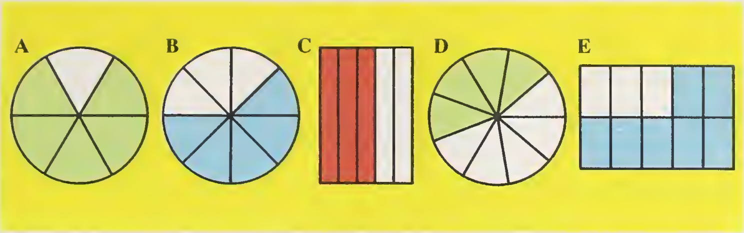
9. Tell what the numerator and the denominator show in each fraction at the right.

For $\frac{3}{5}$ say, "3 is the numerator, so there are 3 equal parts in the fraction. 5 is the denominator, so the whole is divided into 5 equal parts. The size of each part is $\frac{1}{5}$ of the whole."

a. $\frac{3}{5}$ **d.** $\frac{3}{10}$
b. $\frac{7}{8}$ **e.** $\frac{3}{4}$
c. $\frac{2}{3}$ **f.** $\frac{5}{6}$

[W]

10. Draw 6 rectangles. Divide and color parts of your rectangles to show each fraction in the box. Look at rectangles H and I on page 53 for help.



Working with Fractions

[W]

Answer questions 1 to 15 by writing on your paper the letter of one of the above drawings.

In which drawing is the size of one of the equal parts

1. $\frac{1}{5}$? 2. $\frac{1}{8}$? 3. $\frac{1}{9}$? 4. $\frac{1}{10}$? 5. $\frac{1}{6}$?

In which drawing are these parts colored:

6. five $\frac{1}{8}$'s? 7. three $\frac{1}{5}$'s? 8. seven tenths? 9. $\frac{5}{6}$? 10. $\frac{4}{9}$?

In which drawing are these parts white:

11. $\frac{5}{9}$? 12. three $\frac{1}{10}$'s? 13. two fifths? 14. $\frac{3}{8}$? 15. $\frac{1}{6}$?

16. What fraction names the colored part in A? in C? in E? What is the numerator of each fraction?

17. What fraction names the white part in B? in D? in C? What is the denominator of each fraction?

18. Write two addition examples and two subtraction examples for each drawing above. Study these for circle A ⟶

$$\frac{5}{6} + \frac{1}{6} = \frac{6}{6}, \text{ or } 1$$

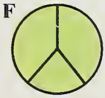
$$\frac{1}{6} + \frac{5}{6} = \frac{6}{6}, \text{ or } 1$$

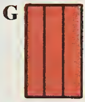
$$\frac{6}{6} - \frac{1}{6} = \frac{5}{6}$$

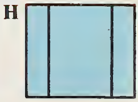
$$\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$$

19. Show as many ways as you can to divide a rectangle into fourths; into sixths; into eighths.

20. Write the letter of each drawing at the right which is not divided into thirds.







A Part of a Group

Meaning [O]

1. In the picture, below, how many boys are watching television? How many girls? How many children in the group?

We may think of this group as a whole. The group has 7 children, or 7 equal parts, so 1 child is $\frac{1}{7}$ of the group. The 4 boys are four $\frac{1}{7}$'s, or $\frac{4}{7}$, of the whole group.

2. The 3 girls are what fractional part of the group?

3. Let 4 girls and 5 boys stand at the front of the room. How many children are in this whole group? You can say that the whole is $\frac{?}{9}$.

4. One child in Ex. 3 is what part of the whole group?

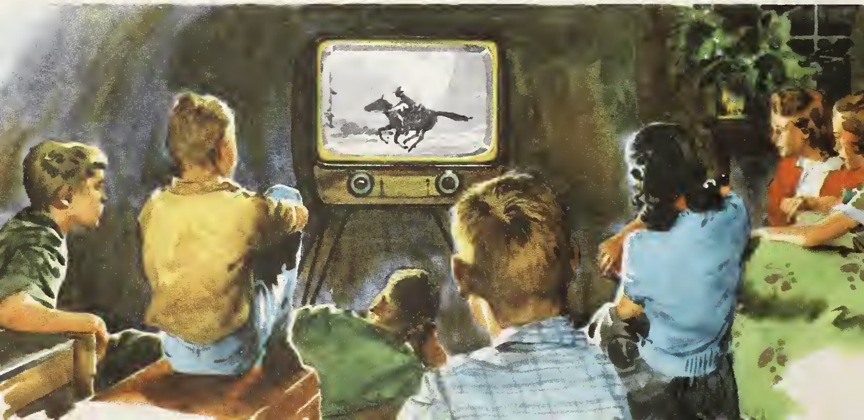
5. In Ex. 3, what part of the group is girls? boys?

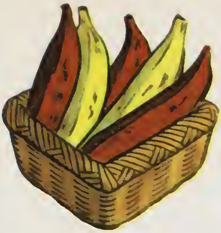
6. Put 5 red books and 3 blue books in a pile. How many books are in the whole pile? Here the whole is $\frac{?}{8}$.

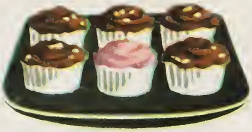
7. One book is what part of the whole pile in Ex. 6? What fractional part of the pile has red books? blue books?

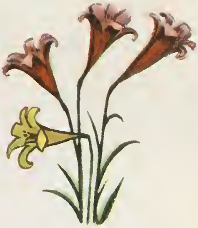
8. Tom had 6 games. He gave away 1 game. What part of his games did Tom give away? What part of his games did Tom have left?

A whole may be a single thing, such as an apple or a circle. A whole may also be a group of like-things, such as a group of children or a group of books.







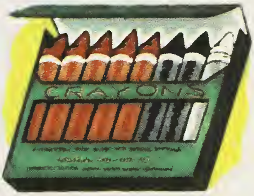


9. For each group of like-things in the pictures on this page, tell how many equal parts there are to make up the whole group. Then use a fraction to tell what part of the whole group one of the things is.

[W]

For Ex. 10–13, from the pictures write the fraction which names the part

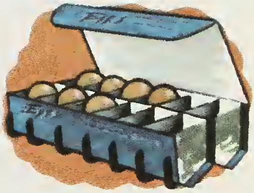
10. of the bananas that are red; that are yellow.



11. of the cupcakes that have chocolate icing; that have pink icing.

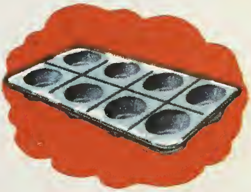
12. of the flowers that are red; that are yellow.

13. of the crayons that are red; that are black; that are white.



14. Use a fraction to tell what part of this egg box is filled; what part of the egg box is empty.

15. Draw a muffin tin like the one shown. Put 3 muffins in the tin. What part of your tin is filled? What part is empty?



16. Draw 3 red marbles, 5 blue ones, and 2 yellow ones. What part of your marbles are red? What part are blue? What part are yellow?

Sharing Things Equally

Meaning; fractional-part division [O]

1. Miss Hill gave 15 pieces of colored chalk to 5 girls to be shared equally. How many pieces should each girl get?

To divide the chalk, each girl took 1 piece. That left _?_ pieces. Then each girl took a second piece. That left _?_ pieces. Then each took a third piece. Did that use up the 15 pieces? Why?

The chalk was divided into 5 equal shares, or parts, so each girl had one fifth ($\frac{1}{5}$) of 15, or _?_ pieces. The work is shown in the box.

$\frac{1}{5}$ of 15 = ?

$$\begin{array}{r} 3 \\ 5\overline{)15} \\ \underline{15} \\ 0 \end{array}$$

2. Tom, Bob, and Jim shared equally 18 marbles. What fractional part of all did each one get? How many marbles did each boy get?

18 ÷ 3 = 6, so 1 of 3 equal parts of 18 = _?_. $\frac{1}{3}$ of 18 = ?

Finding a fractional part of a number is using **fractional-part division.** For Ex. 3a we can say,

"One of the 5 equal parts of 20 = 4" or "$\frac{1}{5}$ of 20 = 4."

Say each example in row 3 in the two ways given above.

	a	b	c	d	e	f	g	h
3.	$5\overline{)20}$	$7\overline{)35}$	$4\overline{)36}$	$8\overline{)40}$	$6\overline{)54}$	$9\overline{)45}$	$8\overline{)72}$	$6\overline{)48}$

We divide to find the size of one of the equal parts of a group. This is fractional-part division.

[W]

4. Write the division fact used to find

a. $\frac{1}{2}$ of 18; **b.** $\frac{1}{3}$ of 27; **c.** $\frac{1}{8}$ of 48; **d.** $\frac{1}{7}$ of 63;

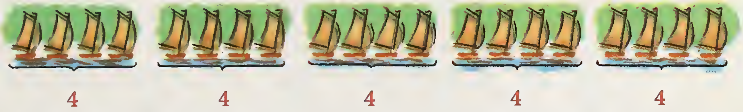
e. $\frac{1}{6}$ of 42; **f.** $\frac{1}{8}$ of 64; **g.** $\frac{1}{9}$ of 36; **h.** $\frac{1}{8}$ of 56.

Acting Out Division Problems

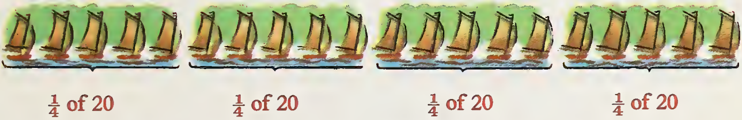
Two meanings of division [O]

Each division example has two meanings: a measurement meaning, and a fractional-part meaning.

$20 \div 4 = 5$ may tell that there are five 4's in 20. The picture just below shows measurement division for 20 divided by 4.



$20 \div 4 = 5$ may tell how many in one of the 4 equal parts of 20 ($\frac{1}{4}$ of $20 = 5$). The picture below shows fractional-part division for 20 divided by 4.



Act out each problem below. Tell whether the measurement meaning of division or the fractional-part meaning is used.

1. Count out 24 books. Divide the 24 books into 4 equal piles. Tell how many books are in each pile. What part of all the books is in each pile?

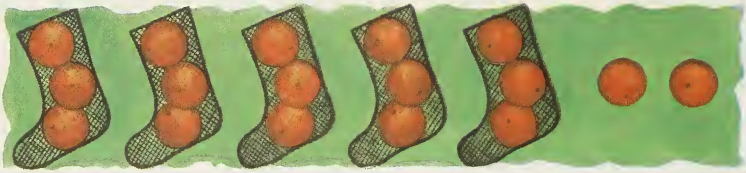
2. Count out 24 books again. Divide the books into piles with 4 books in each pile. Tell how many piles you can make. Here, 24 is measured by what number?

3. Divide 14 children into groups of 2 each. How many groups are there?

4. Divide 14 children into 2 equal groups. How many children are there in each group? What part of all the children is in each group?

[W]

Give a dot picture and a division fact for each problem.



When Do We Have Remainders in Division?

Meaning [O]

1. Mrs. Bell had 17 oranges. She put the same number of oranges in each of 5 Christmas stockings. How many did she put in each stocking? How many oranges were left over?

Box A gives the number record. Can 17 be divided evenly by 3? No, but think of the division table with divisor 3.

What is the next number smaller than 17 which can be divided evenly by 3? We call 15 the **table number.** The 2 left over is the remainder (R).

A

5 ← *quotient*
$3\overline{)17}$ ← *dividend*
$\uparrow$ 15 (5 × 3)
2 ← *remainder*
divisor

2. In Ex. B, can 35 be divided evenly by 8? What table number do we use? Why? What is the quotient and what is the remainder?

B

4, R3
$8\overline{)35}$
32 (4 × 8)
3

3. In Ex. C, why is 42 the wrong table number? What table number should have been used?

C

7 ← too small
$6\overline{)50}$
42 (7 × 6)
8 ← too large

Tell how to correct wrong quotients and remainders in row 4.

	a	b	c	d	e	f
	6, R4	8, R9	9, R4	5, R9	7, R8	9, R4
4.	$9\overline{)58}$	$8\overline{)73}$	$6\overline{)59}$	$7\overline{)44}$	$8\overline{)64}$	$5\overline{)47}$

In division, the remainder (R) should always be smaller than the divisor.

[W]

Write only the quotients and the remainders on your paper.

	a	b	c	d	e	f	g
5.	5)29	8)39	5)37	9)67	4)31	5)42	4)38
6.	6)29	8)78	7)29	6)21	8)22	5)34	5)24
7.	8)45	6)40	7)34	9)87	6)33	8)30	7)25
8.	9)42	8)54	9)35	7)62	9)46	7)48	8)70
9.	7)50	6)47	8)63	9)80	7)41	9)25	7)67

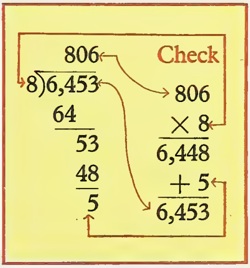
Things to Remember about Division

General ideas [O]

a. Each time a part of the dividend is divided you must write a figure in the quotient. Sometimes this figure is 0.

b. After each subtraction, the remainder must be smaller than the divisor.

c. The quotient is correct if divisor times quotient + remainder = dividend.



The key to success in division of larger numbers is to know the division facts perfectly.

How Well Can You Divide Larger Numbers?

Inventory Test 10 [W]

Copy and divide.

	a	b	c	d	e
1.	4)848	7)560	5)485	6)390	7)756
2.	4)839	3)8,685	6)4,974	8)5,987	5)4,852
3.	6)$84.00	4)$3.88	7)$63.21	7)$50.54	9)$49.25

If you need to, study pages 62–66. Then take this test again.

Helps for Dividing Three-Place Dividends

[O]

1. Try to explain Ex. A to D before you read the helps below.

Even Division	Uneven Division for One or More Divisions		
A	**B**	**C**	**D**
Hundreds Tens Ones 8 2 4)3 2 8 3 2 (8 tens × 4) 8 8 (2 × 4)	68 7)476 42 (6 tens × 7) 56 56 (8 × 7)	87, R3 6)525 48 (? × ?) 45 42 (? × ?) 3	109 8)872 8 (? × ?) 72 72 (? × ?)

2. In Ex. A, pretend that there are 3 bundles of 100 tickets each, 2 bundles of tens, and 8 single tickets. These 328 tickets are to be divided into 4 equal groups.

Divide hundreds: Are 3 hundreds enough to give at least 1 hundred to each of 4 groups? No, that would take more than 3 hundreds, so the quotient cannot have a hundred's figure. Then what will you do?

Divide tens: 3 hundreds and 2 tens are 32 tens. Are 32 tens enough to give some tens to each of 4 equal groups? Yes, so the quotient will have a ten's figure. Then 32 tens is the **first partial dividend.** 32 ÷ 4 = ? Write "8" for the ten's figure in the quotient. Multiply, subtract, and bring down the 8 ones.

Divide ones: 8 ones is the **second partial dividend.** 8 ÷ 4 = ? Write "2" for the one's figure in the quotient. Multiply and subtract.

Check: 82 + 82 + 82 + 82 = ? or 4 × 82 = ?

3. In Ex. B, can there be a hundred's figure in the quotient? No, there are only 4 hundreds. 4 hundreds and 7 tens are 47 tens, so 47 tens is the first partial dividend.

First Partial Dividend (Getting Tens)

Divide tens: For 47 ÷ 7, the table number is 42. 42 ÷ 7 = ? Write "6" for the ten's figure in the quotient.

Multiply and compare: 6 (tens) × 7 = ? Write "42" under 47. Is 42 smaller than 47?

Subtract and compare: 47 − 42 = ? Is the remainder figure, 5, smaller than the divisor figure, 7?

Bring down the 6 ones to make 56 ones for the second partial dividend.

Second Partial Dividend (Getting Ones)

Divide ones: 56 ÷ 7 = ? Where is 8 written?

Multiply and compare: How does the product compare with the second partial dividend? Do you need to subtract?

Check the quotient for Ex. B by adding and by multiplying.

4. In Ex. C, why is 52 (tens) the first partial dividend? Why is 45 (ones) the second partial dividend? Why is 3 the remainder?

Check Ex. C on the board: (6 × 87 + 3 = ?)

5. Explain Ex. D. Divide hundreds: 8 ÷ 8 = ?
Divide tens: 7 ÷ 8 = 0. Write "0" in the quotient.
Divide ones: 72 ÷ 8 = ? Write "9" in the quotient.

[W]

Divide, as in boxes A to D, and check.

	a	b	c	d	e	f
6.	$3\overline{)963}$	$7\overline{)287}$	$6\overline{)654}$	$9\overline{)745}$	$5\overline{)370}$	$4\overline{)838}$
7.	$8\overline{)739}$	$3\overline{)927}$	$6\overline{)548}$	$7\overline{)758}$	$6\overline{)504}$	$3\overline{)696}$
8.	$7\overline{)624}$	$5\overline{)505}$	$6\overline{)429}$	$4\overline{)848}$	$8\overline{)859}$	$6\overline{)200}$

Extra Practice. Work Set 26.

Help with Harder Division

4-place quotients; end zero in the quotient [O]

1. Try to explain Ex. A to D before you read the helps below.

A	B	C	D
(Thousands) ↓ 2,483 4)9,932 8 19 (hundreds) 16 3 3 (tens) 3 2 12 (ones) 12	(Thousands) ↓ 3,726, R1 8)29,809 24 ↓ 5 8 5 6↓ 20 16↓ 49 48 1	980, R4 6)5,884 5 4↓ 48 48↓ 4	(Thousands) ↓ 8,500, R4 7)59,504 56 ↓ 3 5 3 5↓↓ 04

2. In Ex. A, are 9 thousands enough to give some thousands to each of 4 equal groups? Yes, so there will be quotient figures for thousand's, hundred's, ten's, and one's places. The quotient will have _?_ figures. Explain how each figure is found.

3. In Ex. B explain why the first partial dividend has to be 29 (thousands). Explain each division.

4. Explain Ex. C and D. Write zero as the quotient figure when a partial dividend will not contain the divisor at least once.

5. On the board, check the quotients for Ex. A to D.

[W]

Divide and check.

	a	b	c	d	e
6.	6)9,390	7)8,435	8)965	5)8,785	7)39,867
7.	5)5,190	8)30,592	6)50,045	7)7,145	4)9,602
8.	8)42,373	7)5,201	4)3,040	6)20,426	5)12,153

➤ **Extra Practice.** Work Set 28.

Helps in Dividing Money Numbers

[O]

Tell from Ex. A to D the answers for questions 1 to 4.

1. What is the price of 1 book if 9 books cost $3.87?

2. What is the price of 1 chair if 7 chairs cost $59.43?

What is each person's share if

3. $96.23 is divided equally among 4 persons?

4. $450.39 is divided equally among 5 persons?

A	B	C	D
$0.43 9)$3.87 3 6 27 27	$8.49 7)$59.43 56 3 4 2 8 63 63	$24.05, R3¢ 4)$96.23 8 16 16 23 20 3	$90.07, R4¢ 5)$450.39 45 0 39 35 4

5. In Ex. A to D, why is the decimal point in each quotient placed just above the decimal point in the dividend?

6. Explain Ex. A to D. Check each quotient on the board.

Tell which examples below will *not* have a decimal point and dollar sign in the quotient. Tell why not.

[W]

Divide and check.

	a	b	c	d	e
7.	7)$5.95	4)$9.36	6)362	6)$15.48	7)59,871
8.	8)$37.46	5)$2.73	6)$84.54	9)57,474	8)$429.73
9.	8)$4.72	7)$59.75	4)9,215	6)$480.30	8)30,506

➤ **Extra Practice.** Work Set 30.

How Important Are Zeros?

[O]

1. When a quotient is a money number less than 10¢, as in the box, why do we need a zero in dime's place? Why does the zero in dollar's place help?

Not This	This
$. 8 6)$.48	$0.08 6)$0.48

2. How does one zero written at the right of a whole number change the value of the number? two zeros? three zeros? Look at the numbers below for help:

6	3	24	702	568
60	30	2,400	7,020	568,000

3. How does one zero written between two figures change the value of the number? two zeros? Look at these numbers:

27	54	89	756	839
207	504	8,009	75,006	80,039

[W]

Some quotients below are wrong. Copy and work all examples correctly. Then list the examples with wrong quotients.

	a	b	c	d	e
4.	$.8 9)$.72	106 9)9,054	$9.14 6)$54.84	129 7)8,463	7,080, R5 7)49,565
5.	$.08 6)$.54	20, 34 4)80,136	$30.82 3)$92.46	724 8)5,792	10,064 5)50,320

Copy the examples below. Before you work each example, put a small x, as in the box at the right, to show where each quotient figure will be placed.

x x x x
7)56,124

	a	b	c	d	e
6.	8)5,694	6)6,520	4)$89.52	7)$40.00	8)80,480
7.	7)7,153	9)72,081	6)$54.32	5)$98.05	9)63,124

When Do We Multiply? When Do We Divide?

Problem-solving [O]

Read each problem and tell whether you should multiply or divide. Then tell how you decided what to do.

1. In a parade, 204 children marched in rows of 4. There was a flag for each row. How many flags were there?

2. The 204 children rode to the parade in 6 buses. Each bus carried the same number of children. How many children rode in each bus?

3. A school bought 3 flags at $4.95 each. What was the cost of the flags?

4. Five bands each of 36 children marched. How many children was that?

5. Six classes with 35 in each class had planned to march. How many pupils were planned for the parade at first?

6. The boys put out 84 chairs for guests. They arranged them in 7 equal rows. How many chairs were in each row?

7. Six children could hold one banner in the parade. How many banners could be carried by 72 children?

In which problems above should you

a. combine equal smaller groups to get a larger group?

b. use measurement division—that is, measure off the whole group into equal smaller groups of a given size?

c. use fractional-part division—that is, divide up a whole group into equal parts or shares to find how many in one of the equal parts? (The quotient is one fractional part of the whole.)

[W]

Now do the work to solve problems 1–7.

Buying on the Payment Plan

Estimating answers [O]

1. How is paying cash for a thing different from buying it on the payment plan?

2. Jim's mother bought a couch on the payment plan and paid $179.40 in 6 equal payments, one each month. What fractional part of the entire cost did she pay each month?

3. Do you estimate that she paid more or less than $30 each month? Explain how to estimate the answer.

4. Is the quotient in the box correct? Copy the example on the board and work. Check.

$$\boxed{\begin{array}{r} \$29.90 \\ 6\overline{)\$179.40} \end{array}}$$

Estimate each payment in Ex. 5 to 8 by rounding the dividend to the nearest ten dollars.

Find the amount of each payment if you buy

5. a rug for $276.99 and pay in 7 equal payments.

6. a stove for $199.10 and pay in 5 equal payments.

7. a table for $182.10 and pay in 6 equal payments.

8. a television set for $358.02 and pay in 9 equal payments.

Use figures from above and estimate these A. and S. answers:

9. How much more did the rug cost than the stove?

10. A television set and a stove would cost how much?

11. How much less would the stove cost than the television?

12. How much would a rug and a stove cost?

[W]

Find the exact answers for Ex. 5 to 12.

Extra Practice. Work Set 31.

Things We Always Know About Answers

Relationships [O]

Tell which box and which set of words below should be used with Ex. 1 to 6.

larger than *smaller than* *equal to*

In multiplying whole numbers

1. When the multiplier is 1, the product is _?_ the multiplicand.

2. When the multiplier is larger than 1, the product is _?_ the multiplicand.

In dividing whole numbers

3. When the divisor is 1, the quotient is _?_ the dividend.

4. When the divisor is larger than 1, the quotient is _?_ the dividend.

5. Except when subtracting zero, the remainder is _?_ the minuend.

6. In addition, the sum is _?_ than any one of the addends except when 0 is one of two addends.

A

374 *multiplicand*
×1 *multiplier*
374 *product*

B

$$\begin{array}{r} 41 \\ \times 6 \\ \hline 246 \end{array} \qquad \begin{array}{r} 254 \\ \times 3 \\ \hline 762 \end{array}$$

C

75 *quotient*
1)75 *dividend*
↑ *divisor*

D

$$\begin{array}{r} 32 \\ 3\overline{)96} \end{array} \qquad \begin{array}{r} 12 \\ 6\overline{)72} \end{array}$$

E

250 *minuend*
−86
164 *remainder*

F

156 }
+79 } *addends*
235 *sum*

[W]

Four answers are given for each example below. Write the answer you know is wrong. Label it "wrong." Then write an estimate and find the exact answer.

7.	6 × 678	4,800	598	4,200	4,068
8.	8)8,752	1,094	1,100	8,800	1,459
9.	5,806 − 4,739	5,907	1,000	1,067	1,907
10.	3,589 + 4,542	3,911	8,131	7,931	8,000

Extra Practice. Work Set 32.

Problem-Solving Helps

[O]

Most problems can be solved by using one or more of the processes: addition, subtraction, multiplication, and division.

Sam made the cards below to remind himself of the helps in problem-solving that Miss Hill gave the class. Tell which card goes with each of a to g, below.

Say in
own words

Act problem
or
Draw picture

Put together?
Take apart?

Add } Put
Multiply } together
Subtract } Take
Divide } apart

Estimate

Work and check

Reasonable?

a. Read carefully until you can say in your own words what the problem *tells* and what it *asks*.

b. Pretend that the problem is about yourself, your friends, or your family. Think how you could act out the problem or make a drawing to show what is happening in the problem.

c. Ask yourself what happens to groups when you answer the question—are groups to be put together to make a larger group or is one group to be separated into smaller parts?

d. Decide whether to add, subtract, multiply or divide. Remember, groups are put together by adding or by multiplying. A group is separated into parts by subtracting or by dividing.

e. Estimate the answer, using rounded numbers.

f. Find the exact answer and check.

g. Read the problem again to see if your answer is reasonable.

Which helps do you use most often?

Some "Don'ts" in Problem-Solving

[O]

Don't let certain words confuse you.

"Left" in a problem doesn't always mean to subtract.

1. Jean had 38¢ left after her shopping trip. She spent $2.57. How much money did Jean have before her shopping trip?

Tell in your own words what this problem is about. Then find the answer by using toy money.

Comparison words do not always mean to subtract.

2. Henry went 254 miles on his trip. Jack went 57 miles farther. How far did Jack travel?

In this problem do you put groups together or take a group apart? Make a drawing for this problem.

"Each" doesn't always mean to divide.

3. There are to be 15 children at a party. Enough sandwiches must be made to give each child 3. How many sandwiches are needed?

Pretend this is your party. How would you find out how many sandwiches are needed?

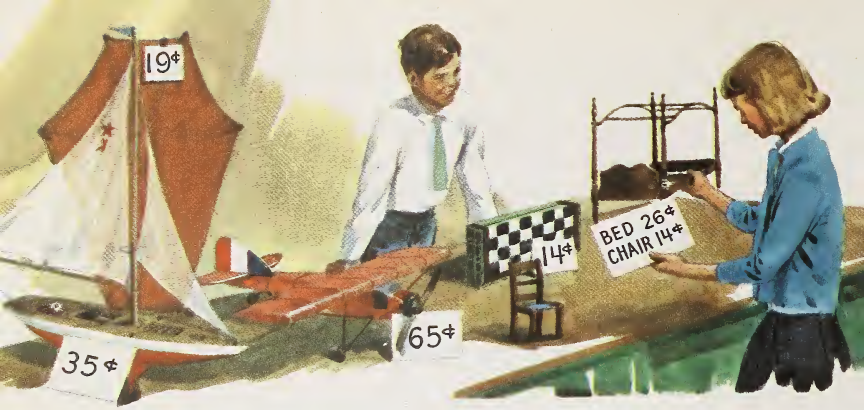
"Altogether" in a problem doesn't always mean to add.

4. Steve counted the marbles in his big bag and in his little bag. Altogether he had 124. If there were 36 marbles in his little bag, how many marbles were there in his big bag?

Is 124 the sum of 36 and another number? How do you find the other number?

Is your answer reasonable? [W]

Now go back and solve problems 1 to 4. Estimate each answer before you start and be sure to check your work afterward. Then read each problem again to see if the answer is reasonable.



A Bargain Sale on Toys

2-question problems **[W]**

To get some money for new records, the members of a fifth-grade class decided to sell some of their old toys, games, and books. They invited the other children to their sale.

Find answers for both questions in each problem below.

1. Betty came to the sale with a half dollar. She bought 3 books at 12¢ each. *How much did the books cost?* Did Betty have money enough left to buy a doll's bed for 26¢?

2. Fred had a dollar bill. He bought a boat for 35¢, a game for 14¢, and a kite for 19¢. *How much did he spend?* How much of his dollar did Fred have left?

3. Tom paid 47¢ for a magnet and a box of 6 colored pencils. The magnet cost 35¢. *What was the cost of the box of pencils?* How much did the pencils cost apiece?

4. There were 8 small dolls on sale at 9¢ each and one large one at 25¢. *How much would the 8 small dolls cost?* How much would all the dolls sell for?

[O]

In each of the above problems, explain why you had to answer the first question before you could answer the second question.

Now read problems 1 to 4 leaving out the first question. These new problems seem to have only one question, but each really has two questions. One question is a **hidden question.**

A problem with a hidden question is a two-step problem. In step 1 you answer the hidden question. In step 2 you use the answer for the first step to help you answer the question you see in the problem.

Tell the hidden questions in problems 5 to 11.

[W]

Study Ex. 5 and the work in the box which shows the two steps for solving the problem. Then solve Ex. 5 to 11.

5. Five toys were priced at 14¢ each. Another one was priced at 39¢. How much would all the toys cost?

Step 1	**Step 2**
14¢	$0.39
×5	+0.70
70¢	?

6. Ann bought a doll chair for 14¢, a doll bed for 26¢, and a doll for 29¢. How much change did she receive from a dollar?

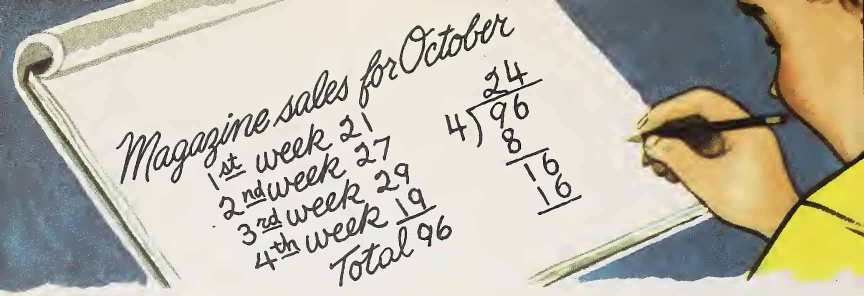
7. An airplane cost 65¢. For an airplane and a box of 6 toy soldiers Bob paid 83¢. How much did the toy soldiers cost apiece if they each cost the same amount?

8. Four small trucks were priced at 15¢ each and one large truck was priced at 39¢. How much would these 5 trucks cost?

9. When Betty was the clerk, she took in 64¢. She sold 5 books at 7¢ each and later on she sold a puppet. How much did the puppet cost?

10. Paul paid 29¢ for a baseball and three times as much as that for a football. How much did both balls cost?

11. Eight girls and twice that many boys brought things for the sale. How many children brought things?



What Is An Average?

Meaning [O]

1. John said, "I sold an average of 24 magazines a week during the month of October." Do you know what John meant by the word **average**?

Look at John's record in the picture. In the 4 weeks, he sold a total of _?_ magazines.

John did not sell exactly 24 magazines any week; but, if he had sold the same number each week, he would have sold $\frac{1}{4}$ of 96, or _?_ magazines. 24 is the average he sold a week.

2. The children in Mary's room sold tickets for the school play. On Monday they sold 23; on Tuesday, 35; and on Wednesday, 11. What was the average number of tickets sold per day?

Why do we add in the box?

Why do we divide 69 by 3?

$23 + 35 + 11 = ?$

?? = *average*

$3\overline{)69}$ (*total*)

3. One week Janet had lunch at school all 5 days. She spent $1.75 for the week. What was her average cost for lunch per day?

Do we add first to find the total? Why not?

What number is the divisor? Why? $\frac{1}{5}$ of \$1.75 = ?

4. Make up a rule for finding an average when the total is given; when it is not given.

5. Tell why fractional-part division is used in finding averages.

Estimating and Finding Averages

[O]

1. This was the attendance record in Tom's room for a week: Monday 29; Tuesday 28; Wednesday 31; Thursday 25; Friday 32. What was the average daily attendance that week?

2. In box A, the numbers in problem 1 are arranged in order from _?_ to _?_. In this group of numbers, where does the average come?

A

25 28 29 31 32

3. On how many days were there more than the average number present? fewer than the average? exactly the average?

4. Tom brought to class a record of the number of bushels of apples his father had taken to market during a week (box B).

Some of the pupils in his class estimated the daily average. Tell what you think of the estimates:

Jack said, "79 bu." Ann said, "93 bu."

Dick said, "My estimate is 86 bu. because 86 is about halfway between the smallest number, 79, and the largest number, 93."

B

Day	Bushels of Apples
Monday	83
Tuesday	79
Wednesday	93
Thursday	84
Friday	82
Saturday	89

5. How close did Dick come to the exact average?

6. What tells you that Jack and Ann made poor estimates?

In Ex. 7 to 12, estimate the average for each group of numbers. Tell what you think to get the estimate.

7. 24; 32; 28; 25; 26
8. 30; 39; 38; 21
9. 55; 59; 46; 61; 54
10. 78; 73; 69; 80; 66; 72
11. 11; 25; 19; 38; 24; 33
12. 47; 50; 41; 39; 43

[W]

Now find the exact averages for Ex. 7 to 12.

How Well Can You Find Averages?

[W]

Read problems 1 to 10 and write down your estimate for each average. Next, go back and find the exact average. Compare your estimate with the exact average.

1. Mary took notices for parents to four rooms which had 37, 29, 34, and 36 children. What was the average number of notices Mary gave to each room?

2. For the deep-freeze, Betty's mother put up 22 boxes of peaches, 16 boxes of pears, 15 boxes of plums, and 19 boxes of berries. What was the average number of boxes of fruit put up by Betty's mother?

3. In 6 weeks Jim has saved $4.50 toward a tennis racket. What was the average amount he saved a week?

To estimate, *think*, "6 × 70¢ = ? 6 × 80¢ = ? Jim saved between 70¢ and 80¢ a week."

4. In 5 school days the children in the Park School borrowed a total of 1,050 books from the library. What was the average number of books borrowed a day?

5. Tom's family took a long trip. They drove 379 miles the first day, 354 miles the next day, and 368 miles the last day. What was their average number of miles a day?

6. During the 3 days, Tom's father spent a total of $22.59 for gasoline. What was the average amount spent a day?

7. Mr. Foster picked 203 bushels of apples from 7 trees. This was an average of how many bushels a tree?

8. Bob earned $2.80 in September, $1.90 in October, $2.80 in November, and $1.90 in December. What was the average amount he earned a month?

9. Find the average of 62, 57, 80, 72 and 64.

10. What is the average of $3.24, $3.50, $3.16, and $3.22?

Do You Understand?

Test of Information and Meaning 2

A	B	C	D	E
$\begin{array}{r}396\\ \times 6\\ \hline\end{array}$	$4\overline{)396}$	$\begin{array}{r}396\\ \times 3\\ \hline\end{array}$	$\begin{array}{r}620\\ 8\overline{)\$49.60}\end{array}$	$\begin{array}{r}396\\ 396\\ +396\\ \hline\end{array}$

1. Which two examples above will have the same answer?

2. How many figures will the quotient for Ex. B have?

3. Which example above could mean the same as $\frac{1}{4}$ of 396?

4. For which example is 2,400 a good estimate?

5. Copy the quotient for Ex. D and put in the dollar sign and decimal point.

6. 4 hundreds and 6 tens = _?_ tens.

7. 7 thousands and 3 hundreds = _?_ hundreds.

8. One whole melon = _?_ thirds; _?_ fifths; _?_ halves.

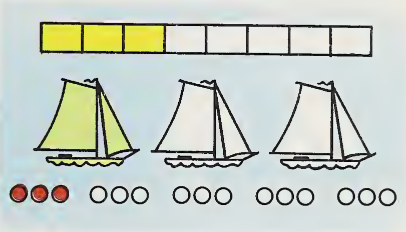
9. Write the fraction which has 5 for the denominator and 3 for the numerator.

In Ex. 10 to 12, write the fraction which shows

10. the colored part of the rectangle.

11. the part of all the boats that is colored.

12. the part of all the balls that is colored.



13. Round to the nearest thousand: **a.** 5,286 **b.** 63,942

14. Round to the nearest dollar: **a.** $16.25 **b.** $49.89

15. Copy and work correctly the example that is wrong: **a.** $\begin{array}{r}3,\ \text{R}7\\ 3\overline{)25}\end{array}$ **b.** $\begin{array}{r}5,\ \text{R}7\\ 8\overline{)47}\end{array}$

How Well Can You Solve Problems?

Problem Test 2

1. Jim has had a paper route for four weeks. The first week he made $5.86; the second week $6.75; the third week $7.28, and the fourth week $6.95. What was the average amount Jim made per week?

2. Jim was saving his money for a bicycle. He saw one for $67.98 and another one for $72.30. How much more did one cost than the other?

3. Jim bought the more expensive bicycle. He paid for it in 6 equal payments. How much did he pay each time?

4. Jim's mother bought him a $2.59 bell and a 98¢ lock for his bicycle. How much change did she get from a $5 bill?

5. Bob delivers 47 papers a day. How many papers does he deliver in 6 days?

6. Bob's father bought a new car for $2,470. He was allowed $950 for his old car. If he pays the balance (amount left to be paid) in 8 equal payments, how much will each payment be?

7. Bob's mother bought a new washing machine. She paid for it in 8 payments of $24.50 each. How much did the washing machine cost?

Do You Make Mistakes?

Diagnostic Test 2

Copy and work.

	a	b	c	d	Study Pages	Practice Sets
1.	29 ×3	47 ×5	752 ×6	546 ×4	41	20
2.	$3.87 ×2	$54.29 ×4	8,005 ×7	3,070 ×8	42	21, 23
3.	8)26	5)34	6)29	7)30	60	
4.	Divide and check. 3)120	4)832	9)379	5)725	62–63	26
5.	4)9,324	6)8,546	5)$78.43	7)15,243	64–65	27, 29

How Well Can You Figure?

Computation Test 2

1. 739 −86
2. 69 ×4
3. 7)378
4. $6.00 −4.89
5. $7.36 ×3
6. 9,050 −1,784
7. 4,070 ×6
8. 4)$9.99
9. 9,000 −8,864
10. $89.76 ×5

11. Divide 9,750 by 6
12. Multiply $70.09 by 8
13. Add: 894 + 6,392 + 749
14. Take $92.48 from $472.03
15. $86.76 ÷ 4 = ?
16. $96.75 + $49.82 = ?
17. Find $\frac{1}{5}$ of $30.20
18. 9 times 7,500 = ?

3

MEASURES
1 BU.
½ PT.
1 QT.
NEXT SHOW AT
AURORA 20 MI.

How Do We Measure?

Inventory [O]

1. Which picture on the bulletin board illustrates the use of a measure of weight? of length? of time? of dry materials? of liquids?

2. In all kinds of measuring, we use units of measure. The foot is a unit of length for measuring other lengths; the pound is a unit of weight for measuring other weights; and so on. Name some other units of measure and tell how they are used.

All measures have large and small units. The unit we use depends upon what we want to measure. In doing the measuring, we find out how many times the unit is used.

3. What is Jerry doing in the picture?

4. Jerry said, "To finish the border for the bulletin board, I need about 36 inches more." 36 inches = _?_ feet, or _?_ yard.

5. The length of the bulletin board is 5 feet, or _?_ inches.

The length and the width are called the **dimensions** of the bulletin board.

6. Name the units in each column in order of size.

a	b	c	d	e
ton	foot	quart	peck	minute
ounce	yard	cup	pint (dry)	day
pound	mile	gallon	bushel	hour
	inch	pint	quart (dry)	second

7. In each column above, tell how many of each unit it takes to make the next larger unit. (Use page 327 for help.)

8. Find clippings from magazines and make drawings for your bulletin board to show the different units of measure you use.

9. Make a table exhibit also. On it put pint, quart, and gallon containers; pint, quart, peck, and bushel containers; a tape measure; a 6-foot rule; and any other measuring tools you have.

Using Reference Measures

[O]

Miss Hill's pupils use measurements they know to help in making rough estimates of measurements they do not know. They call their known measurements **reference measures.**

Here are some of the reference measures they use:

1 foot, about the length of a man's shoe
7 feet, about the height of the door
30 inches, about the height of the teacher's desk
30 feet, about the length of the classroom
1 pound, about the weight of a book
1 ounce, about the weight of 4 new pencils

[W]

Make a list of reference measures for your own use. If you need to, use your reference measures in deciding what units to write for Ex. 1 to 10.

7 FT.
6 FT.
5 FT.
4 FT.
3 FT.
2 FT.
1 FT.

1. Jim is 59 _?_ tall.
2. The kitchen is 12 _?_ long.
3. The candy bar weighs 3 _?_.
4. A bag of potatoes weighs 15 _?_.
5. The roast of meat weighed 5 _?_.
6. The pencil is 7 _?_ long.
7. Mary used 3 _?_ of cloth for her Indian costume.
8. The envelope is 7 _?_ long and 4 _?_ wide.
9. The indoor swimming pool is 75 _?_ long.
10. The box of potato chips weighs 8 _?_.

Estimate, then measure the dimensions (length and width) of

11. a picture in your room.
12. your bulletin board.
13. a paper napkin.
14. a blotter.

How Far Is a Mile?

Meaning; reference measure [O]

Tom said, "The library is just 1 mile from our school. My father measured the distance with the speedometer on our car."

"Then I can walk a mile in 20 minutes," said Jim. "It takes me that long to walk from school to the library."

Andy said, "I can ride a mile on my bike in 7 minutes."

"The library is 10 blocks from school, so there must be about 10 blocks in a mile," said Helen.

Miss Hill said, "Not all blocks are the same length. Sometimes there are more than 10 blocks in a mile, sometimes fewer."

1 mile (mi.) = 5,280 feet (ft.) **1 mile = 1,760 yards (yd.)**

1. Think of some place about 1 mile from your school. Use this distance as your reference measure for 1 mile.

2. Now name a place about 10 miles from your school.

3. How many miles do you ride or walk coming to school?

[W]

4. If you walk 8 blocks, each 600 feet long, have you walked more or less than 1 mile? How much more or less than 1 mile?

5. Jim roller-skated 8 blocks, each 700 feet long. How much more or less than a mile did he skate?

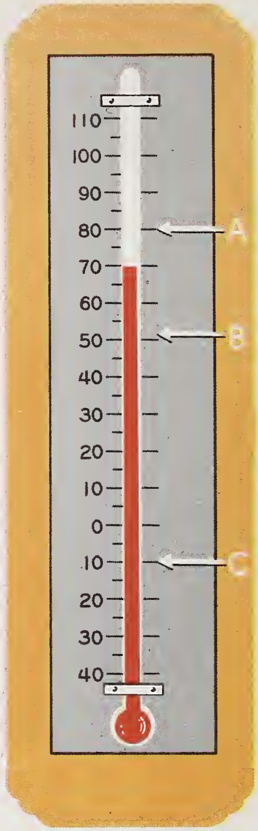
6. An airplane was flying at a height, or altitude, of 10,000 ft. How many feet more or less than 2 miles high was it?

How Hot? How Cold?

Measuring with a thermometer **[O]**

How hot or cold is it? The thermometer tells you. It measures temperature.

The liquid in the tube of the thermometer goes up when the temperature becomes warmer, and down when it becomes colder. When the top of the liquid is opposite the line marked 50 on the scale, we say that the temperature then is 50 degrees (50°). This, of course, means *50° above 0°*.



1. What temperature does the thermometer in the picture show?

2. Between 50° and 60° on the thermometer scale there are _?_ degrees.

3. What would the temperature be if the liquid in the thermometer at the right were at *A*? at *B*? at *C*?

4. When it was 30° in Toronto, it was 75° in Bermuda, or _?_° warmer.

5. Will water freeze at 10° above 0°?

6. In some places it may be as hot as 100° in summer and as cold as 20° below zero in winter. This is a difference of how many degrees? Why do you add to find the difference?

7. What would you say about the climate of a city whose temperature averages 68° in winter and 82° in summer? How much difference in temperature is this?

8. The radio announcer said, "The temperature at 6 o'clock was 28°, which is a drop of 20° since noon." What was the temperature at noon?

Finding the Perimeter of a Rectangle

Meaning [O]

1. The bulletin board in the picture on page 80 is shaped like a rectangle. It has a frame around all four sides. The **distance around the rectangle is its perimeter.**

2. The bulletin board is 5 ft. long and 3 ft. wide. How many feet of frame were used for it?

To find the perimeter you add:
5 ft. + 3 ft. + 5 ft. + 3 ft. = _?_ ft.

3. You can also work as in box A or box B. Tell why each is correct.

A

2 × 5 ft. = 10 ft.
2 × 3 ft. = 6 ft.
10 ft. + 6 ft. = _?_ ft.

B

5 ft. + 3 ft. = 8 ft.
2 × 8 ft. = _?_ ft.

4. At home, Mary has a bulletin board 27 in. long and 18 in. wide. How many inches of frame did it take? On the board, find the answer in three ways.

5. The dimensions of Don's rabbit pen are shown below in diagram C. Explain how to find its perimeter.

[W]

In diagram D below, the sign ′ means "feet." In diagrams E and F, the sign ″ means "inches."

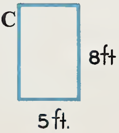
6–8. Using the dimensions shown in diagrams D, E, and F below, find the perimeters of the rectangles.

9. Diagram F is a rectangle. Why is it also a *square*?

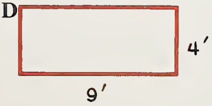
10–12. Find the perimeter of a picture in your room; of the top of your teacher's desk; of your schoolroom.

13. Make a rule for finding the perimeter of a rectangle.

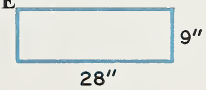
C



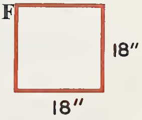
D



E



F



Changing Units of Measure

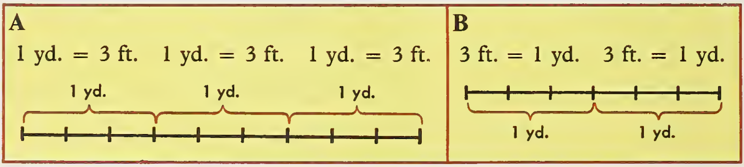
[O]

Joan said, “Dad put in the corner posts for our chicken pen. I measured the length of the pen. It is just 3 yards.”

“The width is just 6 feet.” said Paul, “Now let’s both find out how much wire fencing we need to buy.”

1. Could the children find the perimeter of the pen without expressing both dimensions in the same kind of unit? Why?

2. Joan changed to units of the same kind by expressing her 3 yards in the smaller unit, feet. How does Joan’s number line in box A show 3 groups of 3 feet each? 3 × 3 ft. = _?_ ft.



3. Paul decided to change his 6 feet to the larger unit, yards. Use Paul’s number line in box B and tell how many groups of 3 feet each are in 6 feet. 6 ft. ÷ 3 ft. = ? Each group of 3 feet equals 1 yard, so there are _?_ yards in 6 feet.

The smaller the unit of measure, the more units we need. To change to a smaller unit of measure, multiply.

The larger the unit of measure, the fewer units we need. To change to a larger unit of measure, divide.

4. On the board, find the perimeter of the pen in feet (Joan's way of changing the units) and in yards (Paul's way).

5. On the board, find the cost of the fencing wire at 15¢ a foot for Joan and Paul's chicken pen.

6. Now find the cost of wire at 25¢ a foot for a pen

a. 12 ft. long by 6 yd. wide; **b.** 5 yd. by 9 ft.

Explain how to work problems 7 to 10. Supply the needed numbers from the tables of measures on page 327.

7. Each of 32 children had a half-pint of milk. How many pints did they drink? How many quarts? How many gallons?

Use the number of pints they drank to find the number of quarts, and the number of quarts to find the number of gallons.

8. Sally's mother took a gallon of lemonade to a picnic. That would make _?_ half-pints of lemonade.

In this problem you may want to change the gallon to quarts, the quarts to pints, and the pints to _?_

9. A storekeeper cut a 5-pound cheese into 8-ounce pieces. How many pieces did he get?

10. Jim bought 3 packages of frozen peas weighing 10 oz. each. Was the total weight as much as 2 pounds?

[W]

Now go back and write the work for problems 7 to 10.

Practice in Changing Measures

[W]

Which is more and how much more? For Ex. 1a, *think*, "1 gal. = 4 qt.; 2 × 4 qt. = 8 qt.; so 10 qt. is more than 2 gal."

	a	b	c
1.	2 gal. or 10 qt.	4 ft. or 50 in.	50 oz. or 3 lb.
2.	15 pk. or 2 bu.	3 yd. or 10 ft.	40 da. or 6 wk.
3.	4 pt. or 1 gal.	10 wk. or 2 mo.	15 pt. or 8 qt.

Multiplying by Even Tens

Meaning [O]

1. How many berry bushes will Mr. Kane need if he is to plant 10 rows with 8 bushes in a row?

1 ten × 8 has the same product as 8 × 1 ten, so 10 × 8 = ?

2. How many bushes are needed for 10 rows of 36 bushes each? 1 ten × 36 = _?_ tens, or 360. Add ten 36's to check.

3. What number is 10 times as large as 27? 48? 96? 70?

4. Tell a quick way to multiply a whole number by 10.

5. How many peach trees are there in an orchard which has 20 rows with 34 trees in each row? Find 20 × 34 by adding.

Explain the two other ways to find 20 × 34 in boxes A and B. For box B, think, "20 = 2 tens. 2 tens × 34 = 68 tens. Make 68 in the product mean tens by writing a 0 in one's place."

A

Does 20 = 2 tens?
2 tens × 34 = _?_ tens
Then 20 × 34 = 680.

B

$$\begin{array}{rl} 34 & \textit{multiplicand} \\ \times 20 & \textit{multiplier} \\ \hline 680 & \textit{product} \end{array}$$

(68 tens)

6. How many pencils are in 30 boxes with 24 in each box?

7. How many marbles are in 50 bags with 32 in each bag?

8. How many melons are in 60 boxes with 18 in each box?

You multiply by even tens just as you multiply by ones and write 0 in one's place in the product to show that the product means tens.

[W]

Multiply in Ex. 9 to 16, as in box B. Check as in box A.

9. 60 × 93　　11. 40 × 78　　13. 50 × 89　　15. 80 × 62
10. 90 × 47　　12. 70 × 56　　14. 30 × 75　　16. 40 × 98

Finding Related Products

Readiness for multiplying by 2-place numbers [O]

Read each problem below and tell how you can use the answers for parts a and b to find the answer for part c.

1. Ruth and Martha make 18 sandwiches from 1 loaf of bread. How many sandwiches can they make from **a.** 6 loaves of bread? **b.** 10 loaves? **c.** 10 and 6, or 16 loaves?

2. A parking lot at the zoo has spaces for 14 cars in each row. How many cars are there in the lot when **a.** 8 rows are filled? **b.** 20 rows are filled? **c.** 28 rows are filled?

3. Each row at the concert will seat 25 children. How many children can sit in **a.** 7 rows? **b.** 10 rows? **c.** 17 rows?

4. How many eggs are there in **a.** 8 dozen? **b.** 40 dozen? **c.** 48 dozen?

[W]

Now go back and write the work for Ex. 1 to 4. The work for Ex. 1 is started for you in the box at the right.

$$\begin{array}{r} 18 \\ \times 6 \\ \hline 108 \end{array} \qquad \begin{array}{r} 18 \\ \times 10 \\ \hline 180 \end{array} \qquad \begin{array}{r} 108 \\ +180 \\ \hline ? \end{array}$$

Using Parts of the Multiplier

2-place multipliers [O]

1. Each table in a school lunchroom will seat 16 children. How many children can be seated at 24 tables?

Study Box A. Tell how many children can sit at 4 tables; at 20 tables; at 4 and 20, or 24, tables. 24 × 16 = ?

To multiply by 24, as in box A, we multiply by 4 ones, then by 2 tens. Then we add these two products.

A

Multiply by ones	Multiply by tens	Add the products
16	16	64
×4	×20	+320
64	320	384

B

$$\begin{array}{rl} & 16 \\ & \underline{\times 24} \\ (4 \times 16) \longrightarrow & 64 \textit{ first partial product} \\ (20 \times 16) \longrightarrow & \underline{320} \textit{ second partial product} \\ & 384 \textit{ whole product} \end{array}$$

Box B shows how we write the work as one example. The numbers 64 and 320 are parts of the whole product, so they are called **partial products.**

2. In Ex. C below, 5 × 43 = ? What does 20 × 43 equal? What is the sum of the partial products?

3. Work Ex. D to G on the board to check the partial products. Then add to find the whole product for each example.

C	D	E	F	G
43	86	70	38	38
×25	×37	×49	×56	×36
(5 × 43)→215	602	630	228	228
(20 × 43)→860	2580	2800	1900	1140
1,075	?	?	?	?

To multiply by a 2-place number, multiply by the ones, then by the tens, and then add the partial products.

Tell the 3 steps needed to work each example in row 4. For Ex. 4a say, "Find 5 × 58 and 40 × 58. Then add these two partial products."

	a	b	c	d	e	f	g	h
4.	58	69	85	90	67	58	94	78
	×45	×73	×16	×32	×48	×76	×38	×96

5. Study the examples in row 7 below. Why are there decimal points and dollar signs in the products?

6. How many places are there at the right of the decimal point in each whole product in row 7? Explain.

Money numbers [W]

Check the products in row 7 by multiplying again. Two examples have mistakes.

	a	b	c	d	e
7.	$0.90	$0.75	$0.69	$0.49	$0.80
	×46	×56	×57	×72	×70
	5 40	4 50	4 83	98	$56.00
	36 00	37 50	34 50	34 30	
	$41.40	$42.00	$49.30	$34.28	

Copy the examples in rows 8 and 9 and multiply. Put in decimal points and dollar signs only when they are needed.

	a	b	c	d	e	f	g
8.	$0.74	80	$59	85	$0.50	68	$0.75
	×76	×60	×64	×14	×73	×23	×48
9.	$0.36	90	$84	47	$0.58	79	$0.98
	×46	×36	×71	×45	×57	×43	×87

10. George delivers 56 papers a day. How many papers does he deliver in 12 days? in 24 days? in 36 days?

11. A fifth-grade class has 22 bottles of milk delivered each day. How many bottles of milk would be delivered in 21 days? in 43 days? in 67 days?

Shortening the Second Partial Product

2-place multipliers [O]

A	B
76	76
×34	×34
304	304
2 280	2 28
2,584	2,584

1. Compare the work in the boxes. In Ex. B, what did we omit in one's place of the second partial product?

The 3 of 34 is in _?_ place. By writing the 8 of 228 in ten's place, under the 3, we show that 228 still means 228 _?_.

3 tens × 76 = 228 tens.

2. Explain the second partial product (ten's product) in each example in row 3. For Ex. 3a say, "7 tens × 68 = 476 tens."

[W]

Reverse the factors and multiply again to check these products:

	a	b	c	d	e
3.	68	96	50	87	90
	×75	×58	×84	×96	×60
	340	768	200	522	5,400
	4 76	4 80	4 00	7 83	
	5,100	5,568	4,200	8,352	

Multiply the following as in box B above. Check your work.

	a	b	c	d	e	f	g
4.	78	57	68	85	$0.70	$0.97	67
	×39	×47	×30	×58	×80	×56	×28
5.	76	97	49	75	$0.80	$0.64	87
	×58	×60	×36	×84	×90	×97	×53

6. At 11¢ a foot, what is the cost of 8 ft. of wire? of 12 ft.? of 25 ft.? Cost = number of feet × _?_.

7. At 69¢ a pound, what is the cost of a turkey weighing 9 lb.? 15 lb.? 24 lb.? Cost = _?_ × price per pound.

➤ **Extra Practice.** Work Set 33.

Finding n, the Missing Factor

[O]

1. In box A, 8 is one factor of 48. What is *n*, the other factor? How is *n* found?

2. In box B, 7 is one factor of 595. What is *n*, the other factor? How is the value of *n* found?

A	B	
$8 \times n = 48$ $n \times 8 = 48$ To find n, divide 48 by 8. n = ?	$7 \times n = 595$ $n \times 7 = 595$ To find n, divide 595 by 7. n = ?	85 7)595 56 35 35

Tell *n*, the other factor, in each of the following:

	a	b	c	d
3.	$7 \times n = 63$	$6 \times n = 42$	$56 = n \times 8$	$35 = n \times 5$
4.	$n \times 5 = 45$	$n \times 9 = 36$	$49 = 7 \times n$	$40 = 8 \times n$
5.	$8 \times n = 64$	$9 \times n = 72$	$54 = n \times 9$	$24 = n \times 6$
6.	$n \times 4 = 32$	$n \times 8 = 24$	$36 = 6 \times n$	$28 = 7 \times n$

7. Is 10 a factor of each of the following? Tell why. Tell the other factor in each number.

70 450 80 630 90 160 50 840

8. Is 5 a factor of each of these numbers? Why? Tell the other factor in each number.

60 75 95 100 125 150 165 200

[W]

Find *n*, the other factor, in each of the following:

9.	$n \times 9 = 342$	$456 = 8 \times n$	$6 \times n = 504$	$672 = n \times 7$
10.	$992 = 4 \times n$	$n \times 4 = 836$	$5 \times n = 990$	$536 = n \times 4$
11.	$8 \times n = 4{,}864$	$4{,}314 = n \times 6$	$3{,}780 = 4 \times n$	$n \times 8 = 5{,}000$

We can divide the product by the known factor to find the missing factor.

Comparing Products

Multiplicand-multiplier-product relationship [O]

1. Look at Ex. a and b. How many times as large as the multiplier 2 (Ex. a) is the multiplier 6 (Ex. b)? How many times as large as the product 8 (Ex. a) is the product 24 (Ex. b)?

a	b	c		d	e	f
4	4	12	←*Multiplicand*→	10	10	40
×2	×6	×2	←*Multiplier*→	×5	×20	×5
8	24	24	←*Product*→	50	?	?

2. Now study Ex. a and c. The multiplicand 12 (Ex. c) is 3 times the multiplicand 4 (Ex. a). How many times as large as the product 8 (Ex. a) is the product 24 (Ex. c)?

3. For Ex. d and e, how many times as large as the multiplier 5 is the multiplier 20? Then how many times as large as the product of 5 × 10 will be the product of 20 × 10?

4. For Ex. d and f, how many times as large as the multiplicand 10 is the multiplicand 40? How many times as large as the product of 5 × 10 will be the product of 5 × 40?

Making either factor 2 (or 3 or 4) times as large makes the product 2 (or 3 or 4) times as large.

5. What factor of Ex. g below was changed to make Ex. h, i, and j? Which of Ex. h, i, j will have a product 2 times as large as the product for Ex. g? 3 times? 4 times?

g	h	i	j
27	27	27	27
×10	×20	×30	×40
270	?	?	?

k	l	m	n
12	24	36	48
×6	×6	×6	×6
72	?	?	?

6. What factor of Ex. k was changed to make Ex. l, m, and n? Tell how to use the product for Ex. k to find the products for Ex. l, m, and n.

Three-Place Multiplicands

2-place multipliers [O]

1. A truck driver made 36 round trips one month. On each round trip he drove 128 miles. How many miles did he drive that month?

Study the work in the box. Then tell the number of miles covered on 6 trips; on 30 (3 tens) trips; on 36 trips.

$$\begin{array}{rr} & 128\\ & \times 36\\ \hline (6 \times 128) & 768\\ (3\text{ tens} \times 128) & 3\,84\\ \hline (36 \times 128) & 4{,}608\end{array}$$

On the board copy and finish the examples in row 2. Omit the arrows, but look at them to help you.

	a	b	c	d	e
2.	678	$1.59	$7.25	$856	207
	×39	×24	×68	×45	×30
	↓ 2	↓ 6	↓ 0	↓ 0	210
	2034	318	0	4	

The right-hand figure of each partial product is written in the same column as the figure by which we multiply.

[W]

On your paper, find products for the following:

	a	b	c	d	e	f	g
3.	346	$4.59	304	297	$5.60	958	543
	×89	×76	×80	×59	×78	×98	×87
4.	721	$3.06	973	850	$3.94	172	508
	×48	×67	×82	×45	×34	×67	×49

5. At $1.35 each, what is the cost of 7 records? of 14 records? The second product should be _?_ times the first product.

6. At $2.89 a yard, what is the cost of 8 yards of material? of 32 yards? Use the first product to check the second product.

➤ **Extra Practice.** Work Set 34.

Can You Ask the Missing Question?

M. and D. problems [W]

Write a question to make each of the following into a multiplication or a division problem. Then do the work to answer your questions.

1. The Park School bought 12 new bookcases at $49 each.

2. Mary had lunch at school 5 days one week. She bought the same-priced lunch each day and spent $1.50 in all for lunches.

3. Mr. Day's car will go about 16 miles on 1 gal. of gasoline. The tank on his car holds 15 gal.

4. Mary's father bought 24 apple trees at $2.95 each.

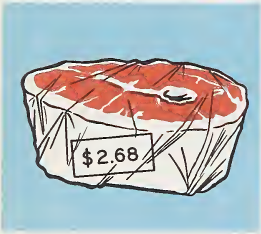
5. Bob read the 182 pages in his book in 1 week (7 da.).

6. Children in each of 12 classes decorated 24 programs.

7. Tom's family used 58 qt. of milk one month. The milk cost 21¢ a quart.

8. Eight bags of potatoes weighed a total of 384 lb.

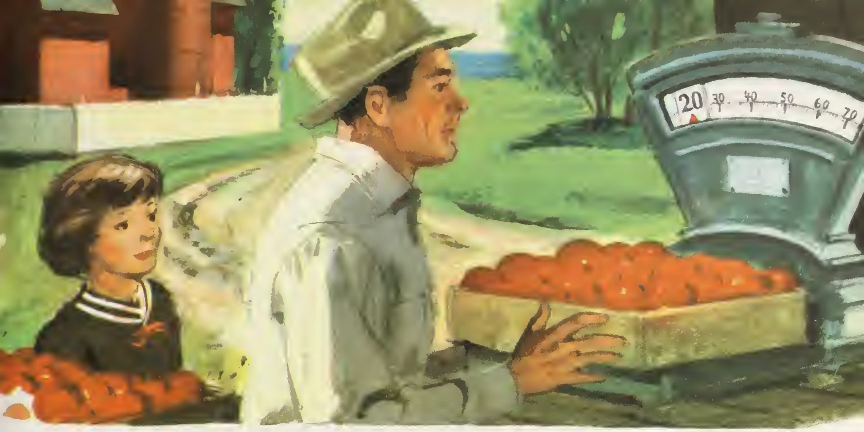
9. The piece of meat in the picture at the left weighs 4 lb.



To Keep in Practice

M. and D. [W]

	a	b	c	d
1. Multiply by 90:	54	26	75	30
2. Divide by 9:	8,730	7,058	$88.92	3,420
3. Multiply by 86:	$3.95	$0.80	$4.73	$0.60
4. Divide by 8:	6,736	9,376	$74.96	5,896
5. Multiply by 79:	$668	$0.47	582	$0.59
6. Divide by 7:	3,009	9,468	$70.28	6,776



Weighing and Selling Vegetables and Fruit

[O]

1. How much does the box of tomatoes on the scales weigh? The empty box weighs 2 lb. Tell the weight of the tomatoes only.

2. We say that the "net weight" of the tomatoes is 18 lb. Explain the meaning of "net weight" in your own words.

[W]

Write out the work for solving problems 3 to 8.

3. Ann's father sold 36 boxes of tomatoes. The average net weight per box was 18 lb. How many pounds were there in all?

4. At $1.15 a box, how much did Ann's father receive for 36 boxes of tomatoes?

5. One bushel of tomatoes weighs 56 lb. What is the weight of 14 bushels?

6. If one bushel of tomatoes sells for $2.50, what will 28 bushels sell for?

7. At a fruit stand, Tom's mother bought 6 lb. of tomatoes at 6¢ a pound and 4 lb. of peaches at 9¢ a pound. How much change did she receive from a dollar bill?

8. Mrs. Gates paid 79¢ for a 25¢ melon and a squash. If the squash weighed 9 lb., how much did it cost per pound?

Four-Place Multiplicands

Emphasis on zeros in multiplicand [W]

Copy just the examples in row 1. Try to work them with your book closed. Check by using the book answers.

	a	b	c	d	e
1.	$70.86	8,009	7,308	6,090	8,948
	×56	×97	×90	×45	×72
	425 16	56 063	657,720	30 450	17 896
	3 543 0	720 81		243 60	626 36
	$3,968.16	776,873		274,050	644,256

Find products for the examples in rows 2 to 4.

	a	b	c	d
2.	93 × 3,509	57 × $50.08	94 × 609	36 × $15.80
3.	64 × 1,786	75 × $94.60	62 × 863	17 × $30.43
4.	48 × 9,000	86 × $53.07	87 × 476	82 × $95.38

Extra Practice. Work Set 35.

Problems without Numbers

M. and D. [O]

Tell what you would do:

1. Fred's family rented a cottage at a lake. If you know the rent for a week and the number of weeks they stayed, how do you find the total amount of rent paid?

2. If you know how many rolls of film Fred bought for taking pictures and the price per roll, how do you find the cost of all the rolls he bought?

3. Fred knows how many hours it took for the trip to the cottage at the lake and how far it was from their home. How can he find the average number of miles they went per hour on that trip?

Nancy's Room in the New House

Problems with missing data [O]

Read these problems about new things for Nancy's room. Tell which problems cannot be solved and why.

1. Nancy's new desk cost $38.96, the desk chair cost $9.50, and the lamp cost $6.98. What did these 3 things cost?

2. The rug cost one fourth as much as the desk, or _?_.

3. Three pairs of curtains cost $7.50. What was the price per pair?

4. Nancy's new bedspread took 15 yd. of material. How much did the material cost?

5. Nancy's mother bought a chair at a sale in the city. It was marked down to $19.89. How much did she save?

6. Nancy's new bed and chest together cost $83.50. The bed cost _?_.

7. Nancy has saved $8.40 to buy a new radio. How much more money does she need?

[W]

Supply sensible numbers for the problems which cannot be solved. Then solve all the problems.

So You Won't Forget!

[O]

A	B	C	D	E
3,286 914 887 +2,015	10,000 −7,984	$6.95 ×7	8)$64.40	83 52 71 64

1. Round each addend in Ex. A to the nearest 10; to the nearest 100; to the nearest 1,000.

2. Jim says that the sum for Ex. A is about 6,000. Bob says that it is about 7,000. Do you agree with Jim or Bob? Why?

3. Estimate the answers for Ex. B and C.

4. Ann says that the exact product for Ex. C is 35¢ less than $49.00. Was she right? Find the exact product.

5. For Ex. D, the quotient is _?_. Why is this division easy?

6. Multiply each number in box E by 10; by 20; by 30.

7. Read these Roman numerals: XXI XIX LX XXXII

8. Name two things we measure by the pound; by the yard; by the gallon; by the bushel; by the liquid quart; by the ton.

Watch the Signs!

A., S., M., D. [W]

	a	b	c	d	e	f
1.	5)750	735 −245	89 ×7	$3.02 +2.98	4)$8.36	504 ×8
2.	6)4,590	603 +548	574 ×9	$23.75 −5.98	$0.96 ×40	$16.05 −9.37
3.	7)3,546	9,000 −8,734	68 ×39	$15.04 −8.39	8)$67.28	$7.98 ×59

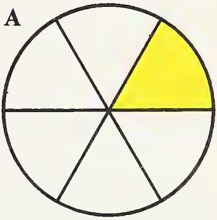
What Is a Fractional Unit?

Meaning [O]

1. In measuring and telling about the size of a whole thing, we usually think of a whole **measurement unit**, such as 1 inch or 1 foot or 1 yard or 1 mile for length; 1 pint or 1 quart or 1 gallon for liquids; 1 pound for weights, and so on. Tell the unit for temperature.

In dividing a whole into equal parts, we may think of the size of one of the equal parts as the **part unit**, or the **fractional unit** by which the whole is measured.

A



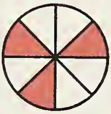
2. Why is $\frac{1}{6}$ the fractional unit for circle A?

3. To name the colored part of circle B, first think of $\frac{1}{8}$, the fractional unit. How many $\frac{1}{8}$'s are colored?

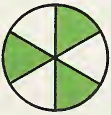
4. Tell the name of the fractional unit for C to F.

A fractional unit is named from the fraction which shows the size of one of the equal parts of the whole.

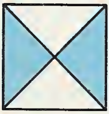
B



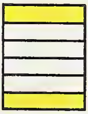
C



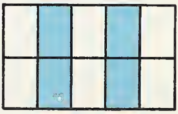
D



E



F

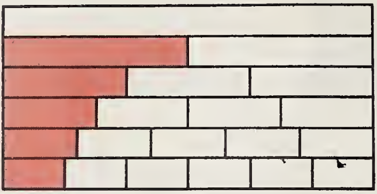


[W]

5. Write fractions to name the colored parts of B to F.

Comparing Unlike-Fractions

[O]



1. Tell what part of each bar is red. Pretend that each bar is a yard long.

2. What is the fractional unit for each row in the chart?

3. Which is longer, $\frac{1}{2}$ yd. or $\frac{1}{3}$ yd.? $\frac{1}{5}$ yd. or $\frac{1}{2}$ yd.? $\frac{1}{4}$ yd. or $\frac{1}{6}$ yd.? $\frac{1}{6}$ yd. or $\frac{1}{5}$ yd.?

4. Say the following parts of a yard in order of size from largest to smallest: $\frac{1}{6}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{9}$ $\frac{1}{12}$ $\frac{1}{3}$

5. Why do denominators help us to decide the order of size?

6. On the board draw three equal circles. Letter them A, B, and C. Shade $\frac{3}{6}$ of A; $\frac{3}{4}$ of B; and $\frac{3}{8}$ of C. Tell which part is larger and why: $\frac{3}{6}$ or $\frac{3}{8}$; $\frac{3}{4}$ or $\frac{3}{8}$; $\frac{3}{4}$ or $\frac{3}{6}$.

7. Each of these fractions stands for how many equal parts? $\frac{5}{12}$, $\frac{5}{8}$, $\frac{5}{6}$, $\frac{5}{9}$. Name the fractional unit for each fraction.

8. Say the fractions in Ex. 7 in order of size from smallest to largest. How do the denominators help us decide the order?

Fractions with different denominators have different fractional units and are called **unlike-fractions.**

9. Give four unlike-fractions with 3 for the numerator.

The more equal parts into which a whole is divided, the smaller each equal part will be.

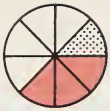
The larger the number of equal parts, as shown by the denominator, the smaller is the size of the fractional unit.

[W]

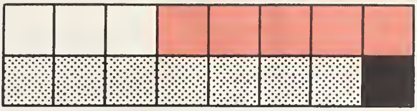
10. Make a chart on your paper like the one at the top of the page but, on each of the bars, color two parts instead of one.

11. Write the fractions which stand for the parts you have shaded. Write them in order of size from smallest to largest.

A



B



Comparing Like-Fractions

Readiness for A. of fractions [O]

1. What part of circle A is red? dotted? white?

2. Which part of circle A is largest—$\frac{3}{8}$, $\frac{1}{8}$, or $\frac{4}{8}$? Why?

3. What is the fractional unit for each fraction in Ex. 2? Which part of the fraction shows what the fractional unit is?

When $\frac{3}{8}$, $\frac{1}{8}$, $\frac{4}{8}$, $\frac{7}{8}$, and $\frac{5}{8}$ are parts of the same whole or of equal wholes they are called **like-fractions.** They all have the same fractional unit as shown by the denominator.

4. What part of rectangle B is dotted? red? white? black?

5. Which part of rectangle B is largest—$\frac{5}{16}$, $\frac{7}{16}$, $\frac{3}{16}$, or $\frac{1}{16}$? Give these fractions in order of size from largest to smallest.

6. In a group of like-fractions of the same or equal things, how do we tell which fraction is largest?

7. Give three like-fractions having $\frac{1}{12}$ for the fractional unit.

Of several like-fractions, the fraction with the largest number for its numerator has the greatest value.

[W]

For each of Ex. 8 to 10, copy the fractions in order of size from largest to smallest.

8. $\frac{2}{9}$, $\frac{5}{9}$, $\frac{3}{9}$, $\frac{7}{9}$

9. $\frac{9}{12}$, $\frac{5}{12}$, $\frac{7}{12}$, $\frac{3}{12}$

10. $\frac{3}{8}$, $\frac{3}{5}$, $\frac{3}{16}$, $\frac{3}{4}$

For Ex. 11 to 14, use the drawings at the top of the page.

11. 1 eighth + 3 eighths = _?_ eighths

12. 3 eighths + 4 eighths = _?_ eighths

13. 3 sixteenths + 5 sixteenths = _?_ sixteenths

14. 7 sixteenths + 1 sixteenth = _?_ sixteenths

Parts of a Group or of a Number

[O]

1. Put 20 books into piles with $\frac{1}{5}$ of them in each pile. In finding $\frac{1}{5}$ of 20, what number is the divisor?

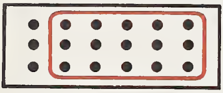
$\frac{1}{5}$ of 20 = _?_ books; $\frac{2}{5}$ is twice as many, or _?_ books.
$\frac{3}{5}$ of 20 books = 3 × 4, or _?_ books; $\frac{4}{5}$ of 20 books = ?

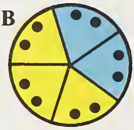
2. Put 12 cards in groups with $\frac{1}{6}$ of them in each group. Tell how many are in $\frac{1}{6}$ of 12. $\frac{2}{6}$ is twice as many, or _?_. How many are there in $\frac{3}{6}$ of 12? in $\frac{4}{6}$? in $\frac{5}{6}$?

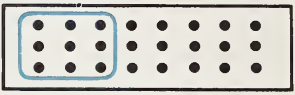
3. On the board draw 15 marbles divided into groups with one third in each group. Draw a line around $\frac{2}{3}$ of the marbles.

Find a drawing below to help with each of Ex. 4 to 6.

4. $\frac{1}{5}$ of 10 = _?_; $\frac{2}{5}$ of 10 = _?_; $\frac{3}{5}$ of 10 = _?_.
5. $\frac{1}{6}$ of 18 = _?_; $\frac{5}{6}$ of 18 = _?_.
6. $\frac{1}{8}$ of 24 = _?_; $\frac{3}{8}$ of 24 = _?_; $\frac{5}{8}$ of 24 = _?_.

A


B


C


[W]

7. On your paper, draw 16 cherries divided into groups with one eighth in each group. Draw a line around $\frac{5}{8}$.

8. Draw 8 tulips. Color $\frac{3}{4}$ of them red and the others yellow.

Copy Ex. 9 to 12 and write answers for each. Draw dot pictures if you need help.

9. $\frac{1}{3}$ of 9 = _?_, so $\frac{2}{3}$ of 9 = _?_.
10. $\frac{1}{4}$ of 16 = _?_; $\frac{2}{4}$ of 16 = _?_; $\frac{3}{4}$ of 16 = _?_.
11. $\frac{1}{7}$ of 21 = _?_; $\frac{3}{7}$ of 21 = _?_; $\frac{5}{7}$ of 21 = _?_.
12. $\frac{1}{8}$ of 40 = _?_; $\frac{3}{8}$ of 40 = _?_; $\frac{5}{8}$ of 40 = _?_.

➤ **Extra Practice.** Work Set 36.

Buying Arts and Crafts Supplies

Fractions in measurement problems [O]

1. Carol asked for $\frac{3}{4}$ yd. of leather for a belt. How many inches of leather is the clerk about to cut off?

1 yd. = _?_ in.; $\frac{1}{4}$ of 36 = _?_; $\frac{3}{4}$ = 3 × 9, or _?_.

2. "This leather is 80¢ a yard," said the clerk. Mary gave her fifty cents and a dime. Was that correct? $\frac{3}{4}$ of 80¢ = ?

Tell how many inches of leather the clerk cut off for each of these sales. Then tell how much she charged.

3. Betty: $\frac{2}{3}$ yd. at 90¢ a yard

4. Mary: $\frac{1}{2}$ yd. at 86¢ a yard

5. Ann: $\frac{5}{6}$ yd. at 66¢ a yard

6. Jean: 2 yd. at 79¢ a yard

7. George asked for $\frac{7}{8}$ lb. of clay to make a small bowl. How many ounces did the clerk weigh out?

1 lb. = _?_ oz.; $\frac{1}{8}$ of 16 = _?_; $\frac{7}{8}$ = 7 × 2, or _?_.

Tell how many ounces of clay the clerk weighed out for each of these sales. Then tell how much she charged.

8. Jim: $\frac{1}{2}$ lb. at 48¢ a pound

9. Tom: $\frac{3}{4}$ lb. at 20¢ a pound

10. Bob: $\frac{5}{8}$ lb. at 24¢ a pound

11. Pat: 3 lb. at 15¢ a pound

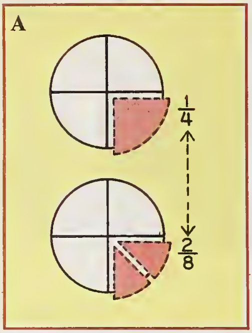
[W]

Now write the work for Ex. 3 to 11. For Ex. 3, write, "$\frac{1}{3}$ of 90¢ = 30¢; $\frac{2}{3}$ of 90¢ = 2 × 30¢, or 60¢."

Equal Fractions

Higher or lower terms [O]

A



1. Pretend that the circles in box A are pies. One fourth of a pie equals how many eighths of a pie of the same size?

2. Do the fractions $\frac{1}{4}$ and $\frac{2}{8}$ in box A both stand for the same amount of pie?

Yes, $\frac{1}{4}$ and $\frac{2}{8}$ of the same thing are equal in value. **$\frac{1}{4}$ and $\frac{2}{8}$ are called equal fractions.**

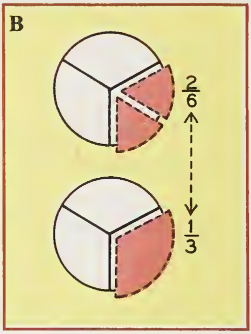
3. Which fractional unit is smaller—$\frac{1}{4}$ or $\frac{1}{8}$? Why can $\frac{2}{8}$ have more parts and still be the same size as $\frac{1}{4}$?

4. Which fraction, $\frac{2}{8}$ or $\frac{1}{4}$, has larger numbers for its terms?

Changing $\frac{1}{4}$ to the equal fraction $\frac{2}{8}$ is called **changing $\frac{1}{4}$ to higher terms.**

Changing $\frac{2}{8}$ to $\frac{1}{4}$ is called **changing $\frac{2}{8}$ to lower terms.**

B



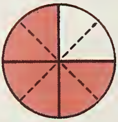
5. Explain the changing in box B.

[W]

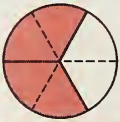
6. Write two equal fractions for the white part of C; of D; of E.

7. Write two equal fractions for the red parts of C; of D; of E. For C, finish this work: $\frac{3}{4} = \frac{?}{8}$

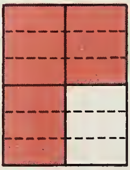
C



D



E



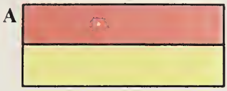
Make drawings to show that

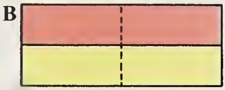
8. $\frac{2}{4} = \frac{1}{2}$
9. $\frac{4}{6} = \frac{2}{3}$
10. $\frac{4}{10} = \frac{2}{5}$
11. $\frac{1}{2} = \frac{3}{6}$
12. $\frac{1}{2} = \frac{4}{8}$
13. $\frac{6}{8} = \frac{3}{4}$
14. $\frac{5}{10} = \frac{1}{2}$
15. $\frac{6}{10} = \frac{3}{5}$
16. $\frac{1}{3} = \frac{2}{6}$

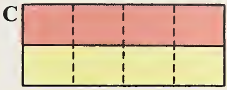
Fractions in Lowest Terms

[O]

1. Rectangles A, B, and C are equal. The red part of A is _?_. The red part of B is $\frac{?}{4}$, or $\frac{1}{2}$. The red part of C is $\frac{?}{8}$, or $\frac{1}{2}$.



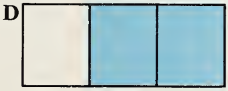


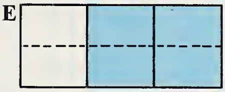


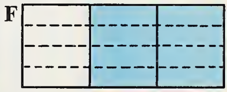
2. Are $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{4}{8}$ (Ex. 1) equal fractions? Which fraction has the smallest numbers for its terms? Which fraction is in lowest terms?

3. Which of the equal fractions in Ex. 2 has the fewest parts? Which has the largest fractional unit? $\frac{1}{2}$ means 1 of _?_ equal parts of the rectangle.

4. Study equal rectangles D, E, and F to help you tell which fraction, $\frac{2}{3}$ or $\frac{4}{6}$ or $\frac{8}{12}$, is in lowest terms. Explain.







5. Of the equal fractions $\frac{2}{3}$ or $\frac{4}{6}$ or $\frac{8}{12}$ (Ex. 4), which one has the fewest parts? the largest fractional unit?

We often use fractions with measures and then it is better to use fractions in lowest terms.

6. Would you ask the clerk for $\frac{6}{12}$ dozen eggs or for $\frac{1}{2}$ dozen?

7. Is it better to say that you used $\frac{6}{8}$ yard of ribbon or $\frac{3}{4}$ yard?

We say that fractions are in best form when they are in lowest terms.

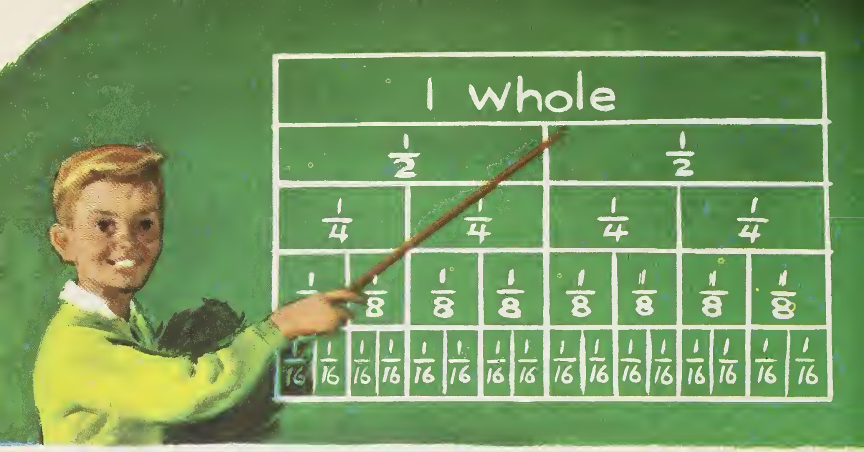
[W]

Draw three equal rectangles for each exercise below. Each time shade parts of the three rectangles to show the three equal fractions.

8. $\frac{1}{4} = \frac{2}{8} = \frac{4}{16}$

9. $\frac{1}{3} = \frac{2}{6} = \frac{4}{12}$

10. $\frac{3}{4} = \frac{6}{8} = \frac{12}{16}$



Using a Fraction Chart

Equivalent fractions **[O]**

Peter's teacher put this fraction chart on the board. Tell how she divided each bar. Use the chart for Ex. 1–7.

1. One whole equals how many halves? how many fourths? how many eighths? sixteenths? $1 = \frac{?}{2} = \frac{?}{4} = \frac{?}{8} = \frac{?}{16}$

2. Tell fractions with *higher* terms that equal $\frac{1}{2}$; $\frac{1}{4}$; $\frac{1}{8}$; $\frac{3}{4}$; $\frac{3}{8}$; $\frac{5}{8}$.

3. Tell fractions with *lower* terms that equal $\frac{14}{16}$; $\frac{10}{16}$; $\frac{6}{16}$; $\frac{6}{8}$; $\frac{4}{16}$; $\frac{4}{8}$.

4. In each group in the box which fraction has the largest fractional unit? the fewest parts?

a. $\frac{3}{4} = \frac{6}{8} = \frac{12}{16}$
b. $\frac{8}{16} = \frac{4}{8} = \frac{1}{2}$
c. $\frac{4}{16} = \frac{1}{4} = \frac{2}{8}$

5. Which fraction in each group in the box is in lowest terms? Why are the answers to Ex. 4 and 5 the same?

[W]

Copy the following and put in the missing numbers:

	a	b	c	d	e	f
6.	$\frac{1}{4} = \frac{?}{8}$	$\frac{1}{8} = \frac{?}{16}$	$\frac{8}{8} = \frac{?}{4}$	$\frac{12}{16} = \frac{?}{4}$	$\frac{6}{16} = \frac{?}{8}$	$\frac{10}{16} = \frac{5}{?}$
7.	$\frac{1}{2} = \frac{?}{16}$	$\frac{1}{4} = \frac{?}{16}$	$\frac{4}{8} = \frac{?}{2}$	$\frac{6}{8} = \frac{?}{4}$	$\frac{8}{16} = \frac{?}{2}$	$\frac{14}{16} = \frac{7}{?}$

8. Copy the chart above. Make each whole bar 8 in. long and $\frac{1}{2}$ in. wide. Keep your chart. You will need to use it often.

Adding and Subtracting Like-Fractions

[O]

1. Andy walked $\frac{3}{8}$ mile to the post office. Then he walked $\frac{3}{8}$ mile farther to the store. How far did Andy walk in all?

Use the fraction chart on page 108 to find the total. Then study and explain the work in box A, below.

2. Hilda lives $\frac{3}{4}$ mile from school. When she has walked $\frac{1}{4}$ mile, how much farther must she go to get to school?

Use the fraction chart to explain how to find the answer. Then explain the work in box B.

3. How is adding and subtracting parts like adding and subtracting wholes?

A

$$\begin{array}{r} 3 \text{ boys} \\ +3 \text{ boys} \\ \hline 6 \text{ boys} \end{array} \left\{ \begin{array}{l} \text{In the} \\ \text{same} \\ \text{way} \end{array} \right\} \begin{array}{r} 3 \text{ eighths} \\ +3 \text{ eighths} \\ \hline 6 \text{ eighths} \end{array} \quad \text{or} \quad \begin{array}{r} \frac{3}{8} \\ +\frac{3}{8} \\ \hline \frac{6}{8} \end{array} = \frac{3}{4}$$

We change $\frac{6}{8}$ to lowest terms.

B

$$\begin{array}{r} 3 \text{ fourths} \\ -1 \text{ fourth} \\ \hline 2 \text{ fourths} \end{array} \quad \text{or} \quad \begin{array}{r} \frac{3}{4} \\ -\frac{1}{4} \\ \hline \frac{2}{4} \end{array} = \frac{1}{2}$$

Why change $\frac{2}{4}$ to $\frac{1}{2}$?

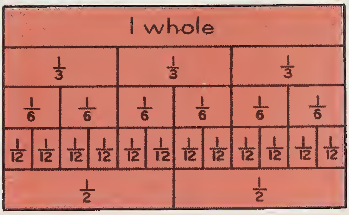
We can add or subtract like-fractions, that is, fractions with the same fractional unit.

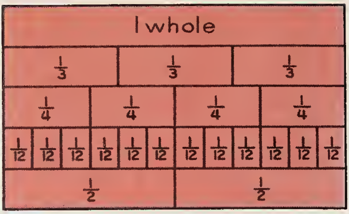
The numerators tell how many equal parts are to be added or subtracted. The denominators help you tell the size of the fractional unit.

[W]

Copy and finish. Use the chart on page 108 to help you change a fraction in the answer to lowest terms.

	a	b	c
4.	$\frac{5}{8} + \frac{2}{8} = \frac{?}{8}$	$\frac{15}{16} - \frac{9}{16} = \frac{?}{16}$, or $\frac{?}{8}$	$\frac{9}{16} + \frac{3}{16} = \frac{?}{16}$, or $\frac{?}{4}$
5.	$\frac{5}{16} + \frac{2}{16} = \frac{?}{16}$	$\frac{3}{8} - \frac{1}{8} = \frac{?}{8}$, or $\frac{?}{4}$	$\frac{7}{16} + \frac{3}{16} = \frac{?}{16}$, or $\frac{?}{8}$
6.	$\frac{12}{16} - \frac{7}{16} = \frac{?}{16}$	$\frac{3}{8} + \frac{1}{8} = \frac{?}{8}$, or $\frac{?}{2}$	$\frac{11}{16} - \frac{3}{16} = \frac{?}{16}$, or $\frac{?}{2}$
7.	$\frac{9}{16} - \frac{8}{16} = \frac{?}{16}$	$\frac{7}{8} - \frac{1}{8} = \frac{?}{8}$, or $\frac{?}{4}$	$\frac{13}{16} - \frac{9}{16} = \frac{?}{16}$, or $\frac{?}{4}$

A

1 whole
$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$
$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$
$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
$\frac{1}{2}$ $\frac{1}{2}$

B

1 whole
$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$
$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$
$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
$\frac{1}{2}$ $\frac{1}{2}$

Other Fraction Charts

Equivalent fractions [O]

Use charts A and B to help you answer questions 1 to 3.

1. One whole equals how many thirds? sixths? twelfths?

2. Tell equal fractions with higher terms for these:

$\frac{1}{3}$; $\frac{1}{6}$; $\frac{2}{3}$; $\frac{4}{6}$; $\frac{5}{6}$; $\frac{1}{4}$; $\frac{3}{4}$; $\frac{1}{2}$.

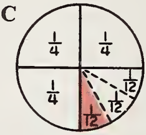
3. Tell an equal fraction with lower terms for each of these:

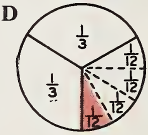
$\frac{4}{6}$; $\frac{2}{12}$; $\frac{6}{12}$; $\frac{2}{4}$; $\frac{8}{12}$; $\frac{9}{12}$; $\frac{10}{12}$; $\frac{2}{6}$.

4. When $\frac{1}{4}$ of circle C is divided into 3 equal parts, why is each part $\frac{1}{12}$ of the whole circle? (Study chart B.)

The whole ($\frac{4}{4}$) would have 4 × 3, or _?_ equal parts.

Then $\frac{1}{4} = \frac{?}{12}$; $\frac{2}{4} = \frac{?}{12}$; $\frac{3}{4} = \frac{?}{12}$.

C


D


5. If $\frac{1}{3}$ of circle D is divided into 4 equal parts, each equal part is _?_ of the whole circle. Why? (Study chart A.)

Then $\frac{1}{3} = \frac{?}{12}$; and $\frac{2}{3} = \frac{?}{12}$.

[W]

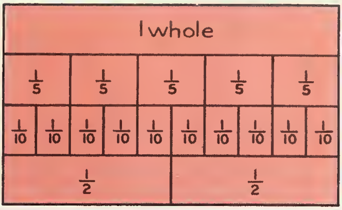
Find the missing numbers in rows 6 to 8. Use charts A and B if you need help.

	a	b	c	d	e
6.	$\frac{1}{3} = \frac{?}{6}$	$\frac{3}{6} = \frac{?}{2}$	$\frac{4}{6} = \frac{?}{3}$	$\frac{4}{12} = \frac{?}{3}$	$\frac{10}{12} = \frac{5}{?}$
7.	$\frac{1}{6} = \frac{?}{12}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{2}{12} = \frac{?}{6}$	$\frac{6}{12} = \frac{?}{2}$	$\frac{8}{12} = \frac{2}{?}$
8.	$\frac{1}{4} = \frac{?}{12}$	$\frac{2}{3} = \frac{?}{6}$	$\frac{9}{12} = \frac{?}{4}$	$\frac{3}{12} = \frac{?}{4}$	$\frac{9}{12} = \frac{3}{?}$

[O]

9. Study chart E. Find on it as many pairs of equal fractions as you can.

E


1 whole
$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$
$\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$
$\frac{1}{2}$ $\frac{1}{2}$

10. When $\frac{1}{2}$ is divided into 5 equal parts, why is each part $\frac{1}{10}$ of the whole? $\frac{1}{2} = \frac{?}{10}$

11. If $\frac{1}{5}$ is divided into 2 equal parts, each part is _?_ of the whole. Why? $\frac{1}{5} = \frac{?}{10}$

[W]

12. Copy charts A and B on page 110. Make each bar 6 in. long and $\frac{1}{2}$ in. wide. Then copy chart E, but make each whole bar 5 in. long by $\frac{1}{2}$ in. wide. Keep the charts to use later.

Copy and put in the missing numbers. Use your charts to help you change a fraction in the answer to lowest terms.

	a	b	c
13.	$\frac{1}{3} + \frac{1}{3} = \frac{?}{?}$	$\frac{5}{12} + \frac{1}{12} = \frac{?}{12} = \frac{?}{2}$	$\frac{7}{12} - \frac{5}{12} = \frac{2}{?} = \frac{1}{?}$
14.	$\frac{1}{6} + \frac{1}{6} = \frac{?}{6} = \frac{?}{3}$	$\frac{1}{12} + \frac{7}{12} = \frac{?}{12} = \frac{?}{3}$	$\frac{3}{10} + \frac{3}{10} = \frac{6}{?} = \frac{3}{?}$
15.	$\frac{2}{6} + \frac{1}{6} = \frac{?}{6} = \frac{?}{2}$	$\frac{11}{12} - \frac{5}{12} = \frac{?}{12} = \frac{?}{2}$	$\frac{11}{12} - \frac{1}{12} = \frac{10}{?} = \frac{5}{?}$
16.	$\frac{5}{6} - \frac{1}{6} = \frac{?}{6} = \frac{?}{3}$	$\frac{5}{12} - \frac{1}{12} = \frac{?}{12} = \frac{?}{3}$	$\frac{1}{10} + \frac{3}{10} = \frac{4}{?} = \frac{2}{?}$
17.	$\frac{4}{5} - \frac{2}{5} = \frac{?}{5}$	$\frac{9}{10} - \frac{1}{10} = \frac{?}{10} = \frac{?}{5}$	$\frac{7}{12} - \frac{1}{12} = \frac{6}{?} = \frac{1}{?}$

To Keep in Practice

[W]

Write answers on folded paper.

	a	b	c	d	e
1.	610 −79	8,436 −2,979	\$40.00 −24.91	\$713.40 −57.98	\$830.02 −197.56
2.	694 58 836 +748	\$9.85 6.49 3.86 +0.27	1,836 79 8 +6,752	18,432 74,938 42,976 +52,046	\$748.62 396.79 42.08 +5.63

Using Fractions in Problems

[O]

Give each answer in best form.

1. In picture A, Jim is cutting a melon into halves. After he cut one-half melon into 3 equal pieces (picture B), he ate one of the pieces. What part of the whole melon did Jim eat?

2. Ann cut one-half cake into 4 equal pieces and ate one of the pieces. What part of the whole cake did she eat? On the board, draw a picture of Ann's cake and color the part she ate.

3. Mary cut a whole pie into 6 equal pieces and ate one of the pieces. Sally cut half a pie of the same size into 3 equal pieces and ate one of the pieces. Which of the girls had the bigger piece of pie? On the board, draw pictures to show how the pies were cut.

4. Harry bought $\frac{1}{2}$ dozen cupcakes. Andy bought $\frac{1}{3}$ dozen. Which boy bought more cupcakes? How many more? Draw pictures on the board to prove your answers.

5. A recipe called for $\frac{7}{8}$ lb. of chopped fruit. Betty had only $\frac{1}{8}$ lb. How much more fruit did she need?

6. Gail used $\frac{1}{8}$ lb. of nuts in her cake and $\frac{1}{8}$ lb. for the icing. In all, she used _?_ lb. of nuts.

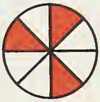
7. Harry lives $\frac{3}{5}$ of a mile from the park and Jack lives $\frac{3}{10}$ of a mile. Which boy lives nearer to the park? Use the chart on page 111 to prove your answer.

Right or Wrong? Prove It!

Review of meanings [O]

Read carefully and think before you answer.

1. $\frac{1}{3}$ dozen oranges is more than $\frac{1}{4}$ dozen.
2. $\frac{3}{4}$ pound of butter is less than $\frac{3}{8}$ pound.
3. To find $\frac{1}{8}$ of a number, divide the number by 8.
4. When $\frac{1}{4}$ of a whole is divided into 2 equal parts, the fractional unit is $\frac{1}{8}$.
5. $\frac{3}{8}$ of the circle at the right is colored.



6. $\frac{2}{3}$ is in lower terms than the equal fraction, $\frac{4}{6}$.
7. One whole melon equals 10 tenths of a melon.
8. The product for 6 × \$4.03 is closer to \$25 than to \$24.
9. To change feet to inches, multiply by 36.
10. 3 × 90¢ is 10 times as much money as 3 × 9¢.
11. $\frac{1}{6}$ of 500 is more than 80 but less than 90.
12. The largest 6-place number is 999,999.
13. 7 dollars equals 700 dimes.
14. The sum of 689 and 793 is closer to 1,500 than to 1,300.

Choose the Best Estimate

Rounding and estimating [W]

Without working the examples below, copy the estimate that you think is closest to the exact answer for each example.

	a	Estimates	b	Estimates
1.	6 × 49	240; 280; 300	9 × \$3.89	\$25; \$27; \$36
2.	353 ÷ 7	50; 40; 30	\$6.59 ÷ 8	90¢; 80¢; 70¢
3.	8 × 97	700; 800; 900	7 × \$5.96	\$35; \$42; \$45
4.	448 ÷ 5	70; 80; 90	\$29.82 ÷ 6	\$4; \$5; \$5.50

Now find exact answers for the examples in rows 1 to 4.

Fractional Parts of More Than One Whole

1. To make lemonade for the club meeting, Gail cut lemons into halves. How many halves are there in 1 lemon? in 2 lemons? in 3 lemons?

2. On the board draw 4 circles. Divide each circle into halves.

$1 = \frac{2}{2}$; $2 = \frac{?}{2}$; $\frac{6}{2} = 3$; $\frac{8}{2} = ?$

3. Gail used only 5 halves. She used _?_ whole lemons and $\frac{1}{2}$ of another. She used $2\frac{1}{2}$ lemons. With your circles show that $\frac{5}{2} = 2\frac{1}{2}$.

4. Count by halves from $\frac{1}{2}$ to $\frac{8}{2}$ as in box A.

5. How many fourths are in one pie?

$1 = \frac{?}{4}$; $2 = \frac{?}{4}$; $3 = \frac{?}{4}$

6. On the board, draw 3 circles. Divide each circle into fourths.

$1\frac{1}{4} = \frac{?}{4}$; $2\frac{1}{4} = \frac{?}{4}$; $2\frac{3}{4} = \frac{?}{4}$

7. Shade parts of the circles you drew in Ex. 6 to make them show that $\frac{7}{4} = 1\frac{3}{4}$.

8. Count by fourths from $\frac{1}{4}$ to $\frac{12}{4}$ (box B).

9. Gail served $\frac{3}{4}$ of the apple pie, $\frac{3}{4}$ of the lemon pie, and $\frac{1}{4}$ of the cherry pie. How many fourths did she serve? How many pies?

$\frac{3}{4} + \frac{3}{4} + \frac{1}{4} = \frac{7}{4}$, or $1\frac{?}{4}$ pies

[O]

A

$\frac{1}{2}$
$\frac{2}{2} = 1$
$\frac{3}{2} = 1\frac{1}{2}$
$\frac{4}{2} = ?$
$\frac{5}{2} = ?$
. . .
. . .
$\frac{8}{2} = ?$

B

$\frac{1}{4}$
$\frac{2}{4} = \frac{?}{2}$
$\frac{3}{4}$
$\frac{4}{4} = 1$
$\frac{5}{4} = 1\frac{1}{4}$
$\frac{6}{4} = 1\frac{?}{2}$
$\frac{7}{4} = 1\frac{?}{4}$
$\frac{8}{4} = 2$
. . .
. . .
. . .
$\frac{12}{4} = 3$

Improper Fractions and Mixed Numbers

1. In the picture, how many $\frac{1}{6}$'s are there in 1 brick of ice cream? in 2 bricks? $1 = \frac{?}{6}$; $2 = \frac{?}{6}$

2. Mary served 5 pieces of the strawberry ice cream and 4 pieces of the vanilla. In all she served _?_ pieces, or _?_ sixths.

$\frac{5}{6} + \frac{4}{6} = \frac{?}{6} = 1\frac{?}{6} = 1\frac{?}{2}$ bricks of ice cream.

3. On the board, draw two rectangles. Divide each into sixths. Shade parts of the rectangles to show that $\frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$.

4. Count by sixths from $\frac{1}{6}$ to $\frac{12}{6}$, as in the box. Use the chart on page 110 if you need more help in changing fractions to lower terms.

Terms [O]

$\frac{1}{6}$
$\frac{2}{6} = \frac{?}{3}$
$\frac{3}{6} = \frac{?}{2}$
$\frac{4}{6} = \frac{2}{3}$
$\frac{5}{6}$
$\frac{6}{6}$, or ?
$\frac{7}{6} = 1\frac{1}{6}$
. . .
. . .
. . .
. . .
$\frac{12}{6} = 2$

Fractions like $\frac{1}{2}$, $\frac{1}{3}$, $\frac{3}{4}$ and $\frac{6}{8}$ are **proper fractions.**

A proper fraction means less than a whole. Its numerator is smaller than its denominator.

Fractions like $\frac{2}{2}$, $\frac{5}{4}$, $\frac{6}{3}$ and $\frac{9}{5}$ are **improper fractions.**

An improper fraction means either a whole or more than a whole. Its numerator is as large as the denominator or larger than the denominator.

Numbers like 1, 2, 4, and 8 are **whole numbers.**

Numbers like $1\frac{1}{2}$, $1\frac{5}{6}$, $2\frac{1}{4}$, and $3\frac{7}{8}$ are **mixed numbers.**

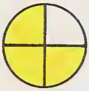
A mixed number is the sum of a whole number and a fraction.

5. Tell which of the following are proper fractions; improper fractions; mixed numbers; whole numbers:

$6\frac{3}{8}$ $\frac{7}{4}$ $\frac{5}{8}$ 9 $\frac{6}{2}$ $\frac{5}{16}$ $2\frac{3}{5}$ $\frac{8}{5}$ $\frac{7}{2}$ $\frac{7}{10}$

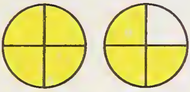
Picturing Different Kinds of Numbers

A **Proper fraction**



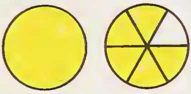
$\frac{3}{4}$

B **Improper fraction**



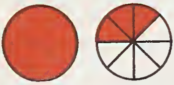
$\frac{4}{4} + \frac{3}{4} = \frac{7}{4}$

C **Mixed number**



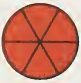
$1 + \frac{5}{6} = 1\frac{5}{6}$

D



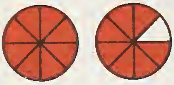
$1 + \frac{3}{8} = ?$

E



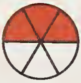
$\frac{6}{6} = ?$

F



$\frac{8}{8} + \frac{7}{8} = \frac{15}{8} = ?$

G



$\frac{3}{6} = ?$

Meaning [O]

1. Read the following:

$\frac{3}{4}$ is a **proper fraction.**

The numerator ⟶ 3

is smaller than the denominator. ⟶ 4

$\frac{3}{4}$ (box A) is _?_ less than 1 whole.

$\frac{7}{4}$ is an **improper fraction.**

The numerator ⟶ 7

is larger than the denominator. ⟶ 4

The improper fraction $\frac{7}{4}$ (box B) equals the mixed number $1\frac{?}{4}$.

$1\frac{5}{6}$ is a **mixed number.** It is the sum of the whole number 1 and the fraction $\frac{5}{6}$. The mixed number $1\frac{5}{6}$ (box C) equals the improper fraction $\frac{?}{6}$.

[W]

2. For each of boxes D to G, write a number to name the colored part of the drawings.

3. For which box did you write a proper fraction? a mixed number?

4. What kinds of fractions are shown in boxes E and F?

5. Draw and shade circles to show each of the following. Use a pattern so your circles will all be the same size.

a. $\frac{2}{3}$ **b.** $\frac{3}{2}$ **c.** $1\frac{1}{4}$ **d.** $\frac{5}{6}$ **e.** $\frac{6}{5}$ **f.** $\frac{4}{4}$

6. Write three proper fractions; three improper fractions; and three mixed numbers.

Changing Improper Fractions

[O]

1. The improper fraction $\frac{3}{2}$ equals what mixed number?
   Think, "$\frac{2}{2} = 1$ whole. Then $\frac{3}{2} = \frac{2}{2} + \frac{1}{2}$, or $1\frac{1}{2}$."

2. The improper fraction $\frac{6}{3}$ equals what whole number?
   Think, "$\frac{3}{3} = 1$ whole. Then $\frac{6}{3} = \frac{3}{3} + \frac{3}{3}$, or _?_ wholes."

3. How can $\frac{9}{4}$ be changed to a mixed number?
   Think, "$\frac{4}{4} = 1$, $\frac{8}{4} = 2$, so $\frac{9}{4} = 2\frac{?}{4}$."

Tell what to think to change the following improper fractions to whole numbers or to mixed numbers:

	a	b	c	d	e	f	g	h
4.	$\frac{9}{8}$	$\frac{17}{5}$	$\frac{12}{4}$	$\frac{19}{6}$	$\frac{15}{3}$	$\frac{17}{8}$	$\frac{19}{12}$	$\frac{21}{16}$
5.	$\frac{8}{3}$	$\frac{18}{6}$	$\frac{9}{5}$	$\frac{25}{12}$	$\frac{7}{2}$	$\frac{31}{16}$	$\frac{13}{8}$	$\frac{20}{10}$

[W]

Copy the fractions in rows 4 and 5. Change each improper fraction to a whole number or to a mixed number.

6. Draw pictures to show for each of these improper fractions the mixed number that is equal to it: **a.** $\frac{6}{5}$ **b.** $\frac{7}{3}$ **c.** $\frac{11}{6}$

7. Draw pictures to show for each of these mixed numbers the improper fraction that is equal to it: **a.** $1\frac{3}{4}$ **b.** $2\frac{1}{6}$ **c.** $1\frac{5}{8}$

8. Make three columns with the headings shown below. Leave enough room for the work which follows.

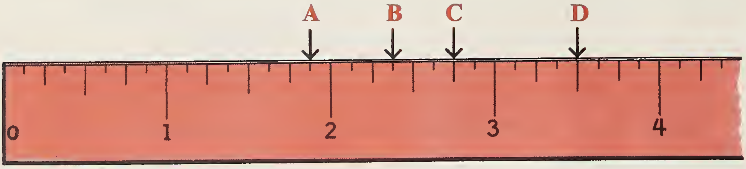
Proper Fractions	Improper Fractions	Mixed Numbers

Copy each of the following numbers in the correct column. You should have $\frac{1}{3}$ of the numbers in each column.

$\frac{4}{5}$ $\frac{3}{4}$ $\frac{5}{4}$ $\frac{9}{10}$ $2\frac{1}{8}$ $\frac{15}{16}$ $\frac{8}{4}$ $4\frac{1}{2}$

$1\frac{7}{8}$ $\frac{4}{9}$ $\frac{9}{8}$ $5\frac{1}{4}$ $\frac{8}{3}$ $\frac{17}{12}$ $3\frac{5}{8}$

Extra Practice. Work Set 37.



Parts of an Inch

1. Each inch on the ruler, above, is divided into _?_ halves; _?_ fourths; _?_ eighths.

$$1 = \frac{?}{2} = \frac{?}{4} = \frac{?}{8}.$$

2. Count by eighths to $\frac{16}{8}$. Study the box.

3. In counting to $\frac{16}{8}$, which improper fractions are changed to mixed numbers? to whole numbers?

Number line [O]

$\frac{1}{8}$
$\frac{2}{8} = \frac{1}{4}$
$\frac{3}{8}$
$\frac{4}{8} = \frac{?}{2}$
$\frac{5}{8}$
$\frac{6}{8} = \frac{?}{4}$
$\frac{7}{8}$
$\frac{8}{8} = 1$
$\frac{9}{8} = 1\frac{?}{8}$
. . .
. . .
. . .
. . .
. . .
. . .
$\frac{16}{8} = ?$

4. The point marked "0" on the ruler, above, is the zero point. From 0 to A is $1\frac{?}{8}$, or $\frac{?}{8}$, inches.

5. From 0 to B is $2\frac{?}{8}$, or $\frac{?}{8}$, inches.

6. From 0 to C is $2\frac{?}{4}$, or $\frac{?}{4}$, inches.

7. From 0 to D is $3\frac{?}{2}$, or $\frac{?}{2}$, inches.

8. In Ex. a to f, below, tell which is a longer distance on the ruler. Prove your answers.

a. 2 in. or $\frac{9}{4}$ in.
b. $\frac{13}{4}$ in. or $3\frac{1}{4}$ in.
c. $2\frac{3}{4}$ in. or $\frac{12}{4}$ in.
d. $\frac{17}{8}$ in. or 2 in.
e. 3 in. or $\frac{21}{8}$ in.
f. $\frac{11}{4}$ in. or 3 in.

[W]

Copy and finish the following. Use the ruler to help you.

	a	**b**
9.	$\frac{5}{8} + \frac{5}{8} = \frac{?}{8} = 1\frac{?}{8} = 1\frac{?}{4}$	$1\frac{1}{2} + \frac{1}{2} = ?$
10.	$\frac{7}{8} + \frac{5}{8} = \frac{?}{8} = 1\frac{?}{8} = 1\frac{?}{2}$	$2\frac{3}{4} + \frac{3}{4} = 3\frac{?}{4} = 3\frac{?}{2}$
11.	$\frac{7}{8} + \frac{7}{8} = \frac{?}{8} = 1\frac{?}{8} = 1\frac{?}{4}$	$1\frac{1}{8} + \frac{5}{8} = 1\frac{?}{8} = 1\frac{?}{4}$

Changing Answers to Best Form

Fractions: A. and S. [O]

1. Tom bought one piece of cheese weighing $\frac{7}{8}$ pound and another weighing $\frac{5}{8}$ pound. How much did it all weigh?

Box A: $\frac{7}{8}$ plus $\frac{5}{8} = \frac{?}{8}$. Does $\frac{12}{8}$ equal more than a whole? Yes, so we change $\frac{12}{8}$ to a mixed number.

Think, "$\frac{8}{8}$ = one whole, $\frac{12}{8} = \frac{8}{8} + \frac{4}{8}$, so $\frac{12}{8} = 1\frac{?}{8} = 1\frac{?}{2}$."

A

$$\begin{array}{r} \frac{7}{8} \\ +\frac{5}{8} \\ \hline \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2} \end{array}$$

2. How much more did one piece of cheese weigh than the other?

Box B: $\frac{7}{8}$ less $\frac{5}{8} = \frac{?}{8}$. $\frac{2}{8} = \frac{?}{4}$. Why do we change $\frac{2}{8}$ to $\frac{1}{4}$?

B

$$\begin{array}{r} \frac{7}{8} \\ -\frac{5}{8} \\ \hline \frac{2}{8} = \frac{1}{4} \end{array}$$

3. In box A we added the _?_ of the like-fractions. In box B we subtracted the _?_ of the like-fractions. Why?

4. In boxes A and B what do the denominators of the fractions tell?

We change improper fractions in answers to whole numbers or to mixed numbers. We change proper fractions to lowest terms. This puts both kinds of fractions in best form.

[W]

Copy and add or subtract. Use charts and boxes on pages 108 to 118 to help you change answers to best form.

	a	b	c	d	e	f	g
5.	$\frac{3}{5}$ $+\frac{4}{5}$	$\frac{5}{6}$ $+\frac{5}{6}$	$\frac{7}{8}$ $-\frac{1}{8}$	$\frac{5}{6}$ $-\frac{1}{6}$	$\frac{7}{10}$ $+\frac{9}{10}$	$\frac{5}{12}$ $+\frac{7}{12}$	$\frac{7}{10}$ $-\frac{3}{10}$
6.	$\frac{2}{3}$ $+\frac{1}{3}$	$\frac{3}{4}$ $+\frac{3}{4}$	$\frac{7}{8}$ $+\frac{7}{8}$	$\frac{4}{5}$ $-\frac{2}{5}$	$\frac{11}{12}$ $-\frac{7}{12}$	$\frac{9}{10}$ $-\frac{7}{10}$	$\frac{11}{12}$ $-\frac{5}{12}$

Extra Practice. Work Set 38.

Adding Three Like-Fractions

[O]

1. One Saturday, Ted rode his bicycle $\frac{9}{10}$ mile to the library, then $\frac{3}{10}$ mile to Bob's house, and then $\frac{7}{10}$ mile to the park. How far did he ride in all?

Are $\frac{9}{10}$, $\frac{3}{10}$, and $\frac{7}{10}$ like-fractions?

For the work in the box why can we think, "9 + 3 + 7 = 19" and write "$\frac{19}{10}$" for the sum? How do we change $\frac{19}{10}$ to a mixed number?

$$\begin{array}{r l} \left.\begin{array}{r} \frac{9}{10} \\ \frac{3}{10} \\ +\frac{7}{10} \end{array}\right\} & \textit{addends} \\ \hline \frac{19}{10} = 1\frac{9}{10} & \textit{sum} \end{array}$$

To add or subtract like-fractions, add or subtract the numerators.

Numerators tell the number of equal parts and denominators tell the size of the fractional unit.

[W]

Copy, add and check in rows 2 and 3. Change improper fractions in the sum to mixed numbers or to whole numbers. Use your charts for help.

	a	b	c	d	e	f	g
2.	$\frac{3}{4}$ $\frac{3}{4}$ $+\frac{1}{4}$	$\frac{3}{5}$ $\frac{2}{5}$ $+\frac{4}{5}$	$\frac{7}{8}$ $\frac{5}{8}$ $+\frac{3}{8}$	$\frac{2}{3}$ $\frac{2}{3}$ $+\frac{2}{3}$	$\frac{5}{6}$ $\frac{5}{6}$ $+\frac{1}{6}$	$\frac{3}{8}$ $\frac{3}{8}$ $+\frac{7}{8}$	$\frac{5}{12}$ $\frac{1}{12}$ $+\frac{1}{12}$
3.	$\frac{3}{10}$ $\frac{1}{10}$ $+\frac{3}{10}$	$\frac{7}{16}$ $\frac{5}{16}$ $+\frac{9}{16}$	$\frac{4}{5}$ $\frac{2}{5}$ $+\frac{4}{5}$	$\frac{5}{8}$ $\frac{7}{8}$ $+\frac{5}{8}$	$\frac{1}{16}$ $\frac{5}{16}$ $+\frac{7}{16}$	$\frac{1}{2}$ $\frac{1}{2}$ $+\frac{1}{2}$	$\frac{7}{10}$ $\frac{9}{10}$ $+\frac{7}{10}$

4. Gail's mother cut a cake into sixteenths. What part of the cake was left after $\frac{3}{16}$ was eaten? $\frac{5}{16}$? $\frac{7}{16}$? $\frac{12}{16}$? $\frac{14}{16}$?

➤ **Extra Practice.** Work Set 39.

Quick Thinking with Rounded Numbers

Mental computation in A., S., M., D. [O]

Say the answers. Do the work in your head.

	a	b	c	d
1.	90 − 40	670 + 120	250 + 250	9 times 60
2.	3 × 50	90 × 2	80 × 7	80 from 690
3.	120 ÷ 6	320 ÷ 8	540 − 230	340 plus 250
4.	6 × 40	7 × 90	720 ÷ 8	970 minus 540
5.	240 ÷ 6	420 ÷ 7	7 × 50	90 times 9
6.	60 + 90	800 − 750	600 − 580	200 less 140
7.	$\frac{1}{4}$ of 360	8 × 80	$\frac{1}{9}$ of 630	360 divided by 8

How Well Can You Follow Directions?

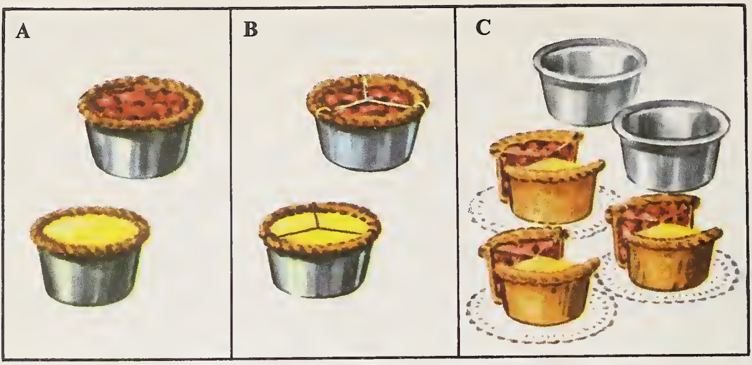
Cumulative review in A., S., M., D. [W]

Copy and work. Check each answer.

1. Add $6.98 to $5.14.
2. Subtract $1.56 from $4.83.
3. Multiply 38 by 4.
4. Divide 245 by 7.
5. Find $\frac{1}{8}$ of 832.
6. 897 plus 3,842 plus 56 = ?
7. $18.06 minus $9.15 = ?
8. Multiply $6.75 by 8.
9. 5,220 divided by 9 = ?
10. Multiply 95 by 40.
11. Add $39.78 to $5.67.
12. 6's in 2,094 = ?
13. $475.30 less $94.16 = ?
14. $396 plus $15.34 = ?
15. Find $\frac{1}{9}$ of $58.32.
16. Multiply 98 by 76.

17-20. Write word problems using the numbers in Ex. 1 to 4. Here is a problem for Ex. 1: Mary's dress cost $6.98 and her shoes cost $5.14. How much did both cost?

21. Make a list of three things we usually buy by the pound; by the dozen; by the yard.



Why Does a Fraction Mean Division?

[O]

1. If three girls share equally the 2 tarts in picture A above, what will be each girl's share? 2 divided by 3 = ?

Pictures B and C will help you. In B, each tart has been cut into thirds. Why was this done?

In C, each girl has taken _?_ of the cherry tart and _?_ of the lemon tart. Each girl gets $\frac{2}{3}$ for her share.

2 wholes ÷ 3 = $\frac{2}{3}$ of a whole.

The fraction $\frac{2}{3}$ means that 2 wholes have been divided into 3 equal parts.

2. Tell each girl's share if Linda and Ann and Mary share equally

a. 9 mints. 9 divided by 3 = ? $\frac{9}{3}$ = ?

b. 3 cookies. 3 divided by 3 = ? $\frac{3}{3}$ = ?

c. 1 apple. 1 divided by 3 = ? Draw a picture.

3. If 4 boys share equally 2 candy bars, what is each boy's share of the candy bars?

2 wholes ÷ 4 = $\frac{?}{4}$, or $\frac{?}{2}$, of a whole.

4. If 6 children share equally 3 sheets of colored paper, what is each child's share? Show this division with sheets of paper.

5. Bob, Tom, Jack, and Jim are to share equally these 3 small pies. What is each boy's share?

3 pies ÷ 4 = ?

Use different colored paper plates for pies. Divide among 4 boys first the cherry pie, then the apple pie, and then the berry pie. Each boy gets $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$, or $\frac{3}{4}$, of a whole.

6. Box D gives three ways to write the work. $\frac{3}{4}$ means "3 divided by _?_." The fraction line between the 3 and the 4 is a sign that means division.

D

$3 \div 4 = \frac{3}{4}$

$\frac{1}{4}$ of $3 = \frac{3}{4}$

$$\begin{array}{r} 0\frac{3}{4} \\ 4\overline{)3} \end{array}$$

7. Box E shows "5 divided by 8" written with the three signs which mean division. On the board, write "9 divided by 12" with the three division signs.

When division is written in fraction form, we should reduce the fraction to lowest terms. $\frac{9}{12} = ?$

E

$5 \div 8$

$8\overline{)5}$

$\frac{5}{8}$

A fraction means division. The numerator is the dividend and the denominator is the divisor.

numerator → 5 ← *dividend*

denominator → 6 ← *divisor*

$6\overline{)5}$ ← *dividend*

↑ *divisor*

[W]

Write the division for each problem below in three ways, as in box D. Reduce fractions in answers to lowest terms.

8. Helen cut a piece of ribbon 3 yards long into 8 equal pieces. How long was each piece?

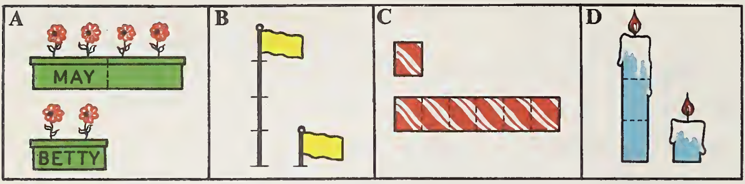
9. Jean's mother cut a 2-pound piece of cheese into 8 equal parts. How much did each part weigh?

10. Betty divided 4 pies equally among 6 people. How much pie did each person get?

11. Divide: **a.** 3 by 9; **b.** 8 by 10; **c.** 9 by 12.

Using Fractions to Make Comparisons

Unit fractions [O]



1. May's flower box is how many times as long as Betty's? The length of Betty's box is what part of the length of May's?

2. In this way, make two comparisons for each of the other pairs of things shown above.

To compare a longer length with a shorter length we use a number that tells **how many times.**

To compare a shorter length with a longer length we use a fraction that tells **what part one is of the other.**

Using Fractions in Problems

A. and S. of like-fractions [W]

1. A jar has $\frac{3}{4}$ quart of tomato juice in it. Another has $\frac{1}{4}$ quart in it. How much juice is there in both jars? How much more juice is there in one jar than in the other?

2. Helen started for the post office which was $\frac{7}{10}$ mile from her home. After she had walked $\frac{3}{10}$ mile, how much farther did she have to go to reach the post office?

3. Mary used $\frac{7}{8}$ yd. of paper to cover one shelf, $\frac{5}{8}$ yd. for another, and $\frac{3}{8}$ yd. for another. She used _?_ yd. in all.

4. Bob bought $\frac{7}{8}$ pound of chocolates and $\frac{3}{8}$ pound of fudge. How many pounds of candy in all did he buy?

5. How much less fudge than chocolates did Bob buy?

6. Tom took $\frac{1}{4}$ hr. to sweep the garage, $\frac{1}{4}$ hr. for the porch, and $\frac{3}{4}$ hr. to wash the car. How long did he work at these jobs?

Work for Young Experimenters

Enrichment activity [O]

Would you like to join the Young Experimenters' Club? Its members are all the children who like to try to find different ways of working with numbers.

See if you can understand the different ways (boxes B, C, and D) some club members worked the example in box A.

A

$$\begin{array}{r} 48 \\ \underline{\times 36} \end{array}$$

B

Fred's way

$$\begin{array}{rl} 48 & \\ \underline{\times 36} & \\ 144 & \rightarrow (3 \text{ tens} \times 48) \\ \underline{288} & \rightarrow (6 \times 48) \\ 1{,}728 & \end{array}$$

C

Tom's way

36 = four 9's

$$\begin{array}{rr} 48 & 432 \\ \underline{\times 9} & \underline{\times 4} \\ 432 & 1{,}728 \end{array}$$

36 × 48 = 1,728

D

Mary's way

36 = six 6's

$$\begin{array}{rr} 48 & 288 \\ \underline{\times 6} & \underline{\times 6} \\ 288 & 1{,}728 \end{array}$$

36 × 48 = 1,728

1. Which part of the multiplier did Fred use first? Which part did he use next? Why does Fred's way work?

2. What factors did Tom use? When the product of 9 times a number is multiplied by 4, we get _?_ times the number.

3. Could Tom have multiplied by 4 first and then that product by 9? Try it. Does one way check the other?

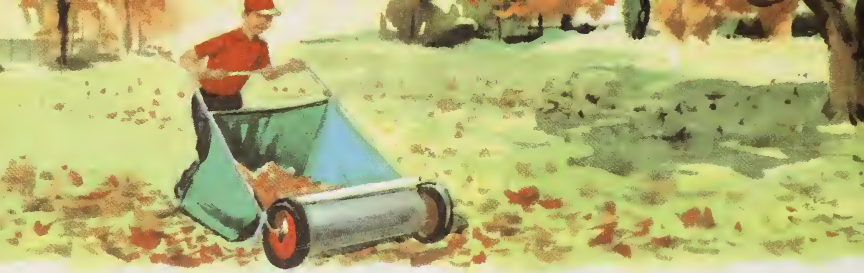
4. What factors of 36 did Mary use?

5. Can you think of at least one other way to work Ex. A?
HELPER: Use 48 for the multiplier. What are some factors?

[W]

Try to work each of Ex. 6 to 17 in three different ways.

6. 24 × 96
7. 42 × 64
8. 12 × 24
9. 30 × 36
10. 32 × 54
11. 45 × 21
12. 16 × 45
13. 64 × 81
14. 56 × 72
15. 40 × 54
16. 48 × 25
17. 18 × 56



Problems with Extra Numbers

Making problems [O]

Tell which numbers in each problem are not needed to solve the problem.

Then make five new problems with no extra numbers.

1. Tom bought a leaf sweeper on Oct. 1 for $42.50. He paid for it in 5 equal payments. The box shows the amounts Tom earned sweeping leaves. What was an average amount Tom earned per week?

1st week	$1.90
2nd week	$2.75
3rd week	$2.70
4th week	$2.85

2. Mrs. Sand bought 3 window shades each 6 ft. long. They cost $2.88 each. How much change did she receive from $10?

3. From 1:00 P.M. to 5:00 P.M. Jim cut 3 lawns. He was paid $1.20 for each lawn. Did he earn as much as $5?

4. Helen went to 6 stores while shopping. She had $2.60 in her purse after she spent $1.75 for a gift and 15¢ for a card. Before she bought these things how much money did she have?

5. There are 50 pages in Kate's snapshot album. Each page holds 6 pictures. Kate now has 24 pages filled with pictures. How many snapshots are in the album?

6. Kate paid 79¢ to have a roll of film developed and printed. The developing charge was 15¢. How much did the printing cost if there were 8 pictures on the roll?

[W]

Solve problems 1 to 6 and the problems you made up.

Do You Understand?

Test of Information and Meaning 3

A $\frac{8}{3}$ $\frac{3}{5}$ $\frac{7}{8}$ $\frac{4}{5}$ $\frac{15}{8}$ $\frac{3}{16}$

B $\frac{8}{2}$ $\frac{15}{8}$ $\frac{13}{8}$ $\frac{12}{6}$

Use the fractions in box A for Ex. 1 to 3.

1. Copy two fractions which have $\frac{1}{8}$ for their fractional unit.

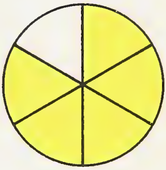
2. Copy two unlike-fractions with the same numerator.

3. Copy two improper fractions and change each to a mixed number.

Use the fractions in box B for Ex. 4 and 5.

4. Copy a fraction which equals 2 wholes.

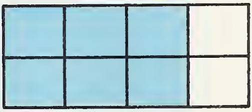
5. Copy a fraction which equals $1\frac{5}{8}$.



Write the fraction which tells

6. the colored part of the circle.

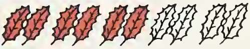
7. the white part of the circle.



Write two equal fractions to name

8. the colored part of the rectangle.

9. the red part of all the leaves.



10. Copy the examples below which mean the same as $5 \div 6$.

$6\overline{)5}$ $5\overline{)6}$ $\frac{5}{6}$ $\frac{6}{5}$ $\frac{1}{6}$ of 5 $\frac{1}{5}$ of 6

11. What is each girl's share if 4 girls share equally
a. 1 apple? **b.** 2 apples? **c.** 3 apples? **d.** 4 apples?

Write the missing words or numbers for Ex. 12 to 17.

12. The turkey weighs 10 _?_.

13. The 120-mile trip took 3 _?_.

14. Tom walked a mile in 15 _?_.

15. The rug is 12 _?_ long.

16. A yard = _?_ in.

17. A mile = 5,280 _?_.

Do You Make Mistakes?

Diagnostic Test 3

Copy and work. You need not check your answers.

	a	b	c	Study Pages	Practice Sets
1.	$\frac{5}{6}$ of 54	$\frac{7}{8}$ of 40	$\frac{2}{3}$ of 90	104	36
2.	$\frac{3}{5}+\frac{1}{5}$	$\frac{3}{4}-\frac{1}{4}$	$\frac{7}{8}-\frac{3}{8}$	108–111	
3.	$\frac{5}{8}+\frac{3}{8}$	$\frac{4}{5}+\frac{4}{5}$	$\frac{7}{10}+\frac{9}{10}+\frac{3}{10}$	119–120	38, 39
4.	40 × 92	50 × 85	70 × 60	88	
5.	43 × 76	96 × 85	83 × $0.57	90–92	33
6.	80 × 932	65 × 409	72 × $8.36	95	34
7.	37 × 4,506	54 × 8,000	68 × $69.04	98	35

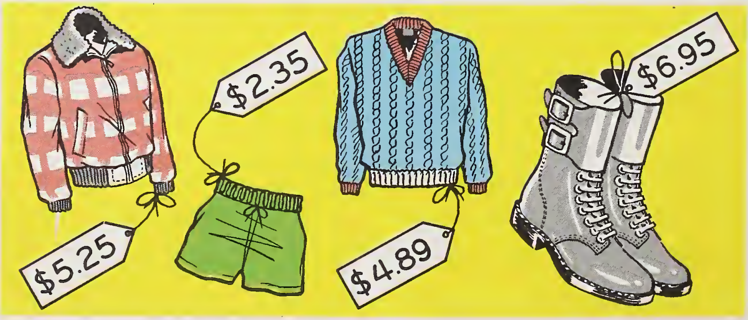
Can You Solve Problems?

Problem Test 3

Read and think carefully as you work Ex. 1 to 10.

1. Before Tom went to camp, his mother bought him the things shown in the picture. How much did she have to pay?

2. Tom bought 3 rolls of film at 46¢ each. What was his change from $5.00?



3. It took Tom and his father and mother 5 hr. to drive the 180 mi. to camp. How many miles an hour did they average?

4. In the camp dining room, each of the 18 tables seated 12 people. There were places for how many people in all?

5. One day, 176 boys went hiking in groups of 8 each. How many groups went?

6. Tom and Ned took turns rowing 1 mile across the lake. Tom rowed for $\frac{3}{4}$ hr. and Ned rowed for $\frac{1}{4}$ hr. How much longer did Tom row than Ned?

7. When Tom hikes $\frac{7}{10}$ mi. to a farm, then $\frac{9}{10}$ mi. farther to a store, how many miles has he hiked from camp?

8. Bob swam these distances on 3 trials: 132 yd.; 143 yd.; 160 yd. What was his average distance?

9. Tom stayed at camp 3 weeks, or how many days?

10. When Tom bought his bus ticket for home, he received 37¢ change from a 5-dollar bill. How much did his ticket cost?

How Well Can You Figure?

Computation Test 3

1. $\begin{array}{r}849\\ \times 7\\ \hline\end{array}$ **2.** $4\overline{)\$8.36}$ **3.** $\begin{array}{r}\$46.00\\ -29.43\\ \hline\end{array}$ **4.** $\begin{array}{r}78\\ \times 50\\ \hline\end{array}$ **5.** $8\overline{)\$54.90}$

6. $\begin{array}{r}\$3.89\\ \times 56\\ \hline\end{array}$ **7.** $9\overline{)4,056}$ **8.** $\begin{array}{r}\$180.75\\ -99.86\\ \hline\end{array}$ **9.** $\begin{array}{r}7,905\\ \times 68\\ \hline\end{array}$ **10.** $6\overline{)3,754}$

11. Multiply $2.96 by 40.

12. Subtract 965 from 1,209.

13. 7,654 + 387 + 2,046

14. Find $\frac{1}{8}$ of 7,680.

15. Take $36.97 from $50.

16. Divide 9,654 by 7.

17. 19,694 + 587 + 5,468

18. $75.39 + $2.56 + $0.86

19. Find $\frac{1}{5}$ of 4,525.

20. Multiply $24.96 by 59.

4

How Many Equal Groups?

Dividing by tens [O]

1. Dick and his father loaded 60 bales of hay on trucks with 20 bales to a truck. How many loads were there?

60 divided by 20 = ?

You can use the picture to find this answer, but without a picture you can work as in box A, B, or C.

Box A. Use bundle numbers and measure 60 (6 tens) into groups of 20 (2 tens) each.

60 divided by 20 = ?

A

Box B. Subtract 20's from 60 one at a time. You can subtract _?_ 20's.

B

$$\begin{array}{rl} 60 & \\ \underline{-20} & (1) \\ 40 & \\ \underline{-20} & (2) \\ 20 & \\ \underline{-20} & (3) \\ 0 & \end{array}$$

Box C shows division. The quotient, 3, means that we subtract three 20's all at one time.

2. Which way of working—A, B, or C—do you like best? Why?

Use the way you like best in telling how to solve problems 3 to 6.

C

$$\begin{array}{rl} 3 & \\ 20\overline{)60} & \\ \underline{60} & (3 \times 20) \end{array}$$

3. Helen winds 30 turns for each layer of wire on the magnet she is making. How many layers will 90 turns make?

4. The principal had 120 pencils. To how many rooms can she send 40 pencils each?

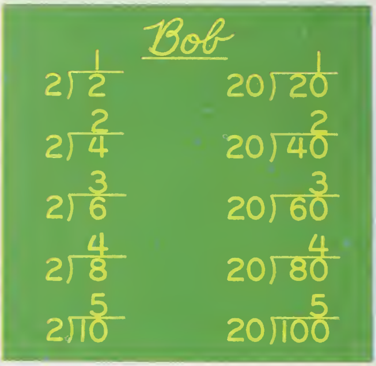
5. The new Metropolitan School received 150 desks. If 30 of those desks are put in each room, how many rooms in the new school can have desks?

6. Miss Hill's class uses 50 milk straws a day. How many days would 250 straws last?

Dividing by 20, 30, 40, and 50

No remainder [O]

1. By what number was Bob dividing in his left column? in his right column?



2. Copy Bob's columns on the board and write the next four facts for each column.

3. For what division tables have you written the answers?

4. As you did for Ex. 2, write the division tables for dividing to 27 with divisor 3 and to 270 with divisor 30.

5. Write on the board the division tables with divisor 4 and with divisor 40. Then show that each fact in the division table with divisor 40 has a helping fact in the table with divisor 4.

6. On the board, write the division tables with divisor 5 and with divisor 50.

7. Say the division table with divisor 20 this way: "20's in 20 = 1; 20's in 40 = 2; 20's in 60 = 3;" and so on.

8. Do the same for the division table with divisor 30; with divisor 40; with divisor 50.

[W]

Use helping facts from the division tables with divisors 2, 3, 4, and 5. Find how many

	a	b	c	d	e	f
9. 20's in	120	80	100	160	140	180
10. 30's in	90	150	210	180	240	270
11. 40's in	120	200	280	320	160	360
12. 50's in	150	250	450	300	200	400

13. Allen's class collected 140 old comic books. Allen and Peggy are tying them in bundles with 20 books in a bundle. How many bundles can they make?

$$\begin{array}{r} 7\ \textit{quotient}\\ 20\overline{)140}\\ \underline{140}\ (7 \times 20) \end{array}$$

We measure or divide 140 (14 tens) by 20 (_?_ tens). What is the helping division fact for 20's in 140?

In the box, we are dividing 140 ones so we place the quotient figure, 7, over one's place of 140. How many 20's are subtracted all at one time?
Allen and Peggy can make _?_ bundles.

On the board, check the quotient, 7, by subtracting 20's one at a time as in box B on page 131. Is dividing faster?

We divide by tens just as we divide by ones.

[W]

Copy and divide. Use helping facts from the tables with divisors 2, 3, 4, and 5. Place the quotient figures correctly.

	a	b	c	d	e	f
14.	$20\overline{)40}$	$50\overline{)400}$	$30\overline{)270}$	$40\overline{)320}$	$50\overline{)200}$	$20\overline{)160}$
15.	$40\overline{)360}$	$20\overline{)120}$	$50\overline{)350}$	$20\overline{)100}$	$40\overline{)280}$	$30\overline{)180}$
16.	$30\overline{)240}$	$50\overline{)300}$	$20\overline{)80}$	$40\overline{)240}$	$30\overline{)210}$	$50\overline{)450}$
17.	$50\overline{)150}$	$40\overline{)160}$	$30\overline{)150}$	$20\overline{)60}$	$40\overline{)120}$	$50\overline{)100}$

Dividing by 60, 70, 80, and 90

No remainder [O]

1. On the board, copy the columns from the box and finish each column.

2. How do tables with divisors 6, 7, 8, and 9 help you to make tables with divisors 60, 70, 80, and 90?

3. Read the column for dividing by 60. Say, "60's in 60 = 1; 60's in 120 = 2; 60's in 180 = 3;" and so on.

4. Read each of the other columns the same way.

$\begin{array}{r}1\\60\overline{)60}\end{array}$	$\begin{array}{r}1\\70\overline{)70}\end{array}$	$\begin{array}{r}1\\80\overline{)80}\end{array}$	$\begin{array}{r}1\\90\overline{)90}\end{array}$
$\begin{array}{r}2\\60\overline{)120}\end{array}$	$\begin{array}{r}2\\70\overline{)140}\end{array}$	$\begin{array}{r}2\\80\overline{)160}\end{array}$	$\begin{array}{r}2\\90\overline{)180}\end{array}$
$\begin{array}{r}3\\60\overline{)180}\end{array}$	$\begin{array}{r}3\\70\overline{)210}\end{array}$	$\begin{array}{r}3\\80\overline{)240}\end{array}$	$\begin{array}{r}3\\90\overline{)270}\end{array}$
...	...	...	...
...	...	...	...
...	...	...	...
...	...	...	...
...	...	...	...
$\begin{array}{r}9\\60\overline{)540}\end{array}$	$\begin{array}{r}9\\70\overline{)630}\end{array}$	$\begin{array}{r}9\\80\overline{)720}\end{array}$	$\begin{array}{r}9\\90\overline{)810}\end{array}$

5. If 1 package can be made from 50 sheets of paper, how many packages can be made from 250 sheets? from 400 sheets? from 300 sheets? from 450 sheets?

6. How many packages with 60 sheets in a package can be made from 120 sheets? from 240 sheets? from 480 sheets?

7. A farmer has 240 pounds of potatoes. How many 60-pound bags of potatoes can he make? How many 80-pound bags?

[W]

Copy and divide. Be careful to write the quotient figure in one's place if you are dividing ones.

	a	b	c	d	e	f
8.	$60\overline{)300}$	$80\overline{)560}$	$70\overline{)490}$	$80\overline{)480}$	$70\overline{)630}$	$90\overline{)270}$
9.	$70\overline{)420}$	$60\overline{)360}$	$80\overline{)640}$	$80\overline{)720}$	$70\overline{)210}$	$80\overline{)320}$
10.	$80\overline{)400}$	$70\overline{)560}$	$60\overline{)480}$	$90\overline{)360}$	$90\overline{)720}$	$70\overline{)280}$
11.	$90\overline{)540}$	$70\overline{)350}$	$90\overline{)450}$	$60\overline{)540}$	$90\overline{)810}$	$60\overline{)420}$

Uneven Division Facts as Helpers

Dividing by even tens [O]

1. The division examples in each box below are pairs. Tell how the examples in box A are alike and how they are different.

A

$$\begin{array}{r} 3,\ \text{R}2 \\ 5\overline{)17} \\ \underline{15} \\ 2 \end{array} \qquad \begin{array}{r} 3,\ \text{R}20 \\ 50\overline{)170} \\ \underline{150} \\ 20 \end{array}$$

B

$$\begin{array}{r} 7,\ \text{R}3 \\ 8\overline{)59} \\ \underline{56} \\ 3 \end{array} \qquad \begin{array}{r} 7,\ \text{R}30 \\ 80\overline{)590} \\ \underline{560} \\ 30 \end{array}$$

2. Are there as many 50's in 170 as there are 5's in 17? What table number helps you for $5\overline{)17}$? for $50\overline{)170}$?

3. In box B, tell how $8\overline{)59}$ helps us to divide in $80\overline{)590}$. Are there as many 80's in 590 as there are 8's in 59?

Tell how to use an uneven division fact as a helper for each division in row 4, below. For Ex. 4a say, "7's in 45 are 6 and a remainder, so 70's in 450 are 6 and a remainder."

The plus sign after each quotient means that the division is not even. There is a remainder, but we do not show it when we are only estimating the quotient.

	a	b	c	d	e	f
	6^+	7^+	4^+	9^+	7^+	3^+
4.	$70\overline{)450}$	$40\overline{)290}$	$80\overline{)390}$	$60\overline{)570}$	$50\overline{)380}$	$90\overline{)280}$

Say the helping division facts and the quotients for rows 5 to 8. For Ex. 5a say, "5's in 26 are 5 and a remainder, so 50's in 260 are 5 and a remainder."

5.	$50\overline{)260}$	$70\overline{)580}$	$90\overline{)570}$	$80\overline{)460}$	$20\overline{)70}$	$30\overline{)80}$
6.	$40\overline{)390}$	$60\overline{)500}$	$80\overline{)710}$	$70\overline{)600}$	$90\overline{)850}$	$50\overline{)190}$
7.	$70\overline{)650}$	$80\overline{)670}$	$60\overline{)230}$	$90\overline{)380}$	$70\overline{)500}$	$40\overline{)380}$
8.	$90\overline{)620}$	$60\overline{)410}$	$50\overline{)320}$	$80\overline{)750}$	$90\overline{)200}$	$60\overline{)350}$

Remainders When Dividing by Tens

[O]

1. Sally had 160 old post cards. She put them into packages of 30 each. She could make _?_ packages of 30 and have _?_ cards left over.

5, R10
$30\overline{)160}$
150 (5 × 30)
10

Do we need to subtract 30's one at a time? No, not if we use an uneven division fact to help us decide how many 30's to subtract all at one time.

For 30's in 160, use 3's in 16 as a helping fact. The quotient is _?_ and a remainder.

We can subtract five 30's, so we write 5 as the quotient figure.

5 × 30 = ? Where is 150 written so that it can be subtracted? What is the remainder?

Sally could make _?_ packages of 30 each. This would use up 5 × 30, or _?_, of her cards. She would have _?_ cards left.

For each example in row 2, tell the uneven division fact you use as a helper, and then give the remainder.

	a	b	c	d
2.	4, R ? $20\overline{)90}$ 80 (4 × 20) 10	5, R ? $40\overline{)230}$ 200 (5 × 40) ??	7, R ? $60\overline{)470}$ 420 ??	3, R ? $70\overline{)250}$ 210 ??

[W]

Copy and divide. Look at the box if you need help.

	a	b	c	d	e
3.	$30\overline{)80}$	$50\overline{)320}$	$60\overline{)580}$	$40\overline{)260}$	$70\overline{)450}$
4.	$50\overline{)490}$	$80\overline{)600}$	$90\overline{)370}$	$60\overline{)510}$	$80\overline{)350}$
5.	$90\overline{)650}$	$40\overline{)180}$	$50\overline{)390}$	$70\overline{)540}$	$30\overline{)290}$
6.	$60\overline{)200}$	$80\overline{)740}$	$70\overline{)340}$	$90\overline{)820}$	$30\overline{)230}$

Extra Practice. Work Set 40.

Multiply or Divide? Why?

Differentiating processes [O]

We multiply to find the total of several equal groups.
We divide to separate a group into equal smaller groups.

The problems below are in pairs. Tell why we multiply in one problem of each pair and divide in the other.

1. a. How many daisies will Barbara use if she puts 15 daisies in each of the 8 vases in the picture?

b. Nancy picked 60 roses. How many bouquets with 20 roses in each could she make?

2. a. If you cut a cake into 10 pieces, how many cakes like this does it take to make 90 pieces of the same size?

b. How many slices of bread are there in 12 loaves if each loaf is cut into 18 slices?

3. a. Bob and Jim had 80 gumdrops. They put them into boxes with 20 in a box. How many boxes did they use?

b. Sue, Elsie, and June each painted 15 place cards. How many was this in all?

4. a. If each child runs 30 yd. in a 120-yard relay race, how many children must there be on a team?

b. Each of the 4 sections of a school wall painting is 36 in. long. What is the total length of the painting?

[W]

Do the work to solve each problem above.

Dividing by Tens and Ones

Ways of working [O]

1. Mary had 128 Christmas seals. She wanted to put them into envelopes with 32 seals in each envelope. She thought, "How many envelopes do I need?"

Use your own way to answer Mary's question before you read on. Then explain how the work in each of boxes A to C answers Mary's question.

A	B	C
Subtracting	**Building a Multiplication Table**	**Dividing**
128 − 32 = 96 (1) 96 − 32 = 64 (2) 64 − 32 = 32 (3) 32 − 32 = 0 (4)	$\begin{array}{r}32\\ \times 2\\ \hline 64\end{array}$ $\begin{array}{r}32\\ \times 3\\ \hline 96\end{array}$ $\begin{array}{r}32\\ \times 4\\ \hline 128\end{array}$	$\begin{array}{r}4\\ 32\overline{)128}\\ \underline{128}\end{array}$ (4×32) Think this: $\begin{array}{r}4\\ 30\overline{)120}\end{array}$

In box A, how many times was 32 subtracted? Is subtracting 32's one at a time a long way of working?

In box B, why does the table for 32's stop at four 32's?

In box C, to divide 128 by 32, first estimate the number of 32's in 128 by using the 30 (in 32) and the 120 (in 128). *Think,* "30's in 120 (or 3's in 12) = _?_."

The estimate is 4, so probably there are four 32's in 128. Why is the 4 in the quotient written over the 8 of 128?

Now test the estimate by multiplying. 4 × 32 = ? Is the estimate correct? Can four 32's be subtracted all at one time?

Is dividing faster than subtracting 32's one at a time?

Mary needed _?_ envelopes.

2. Jerry had 198 Christmas seals. He wanted to put 31 in each envelope. How many envelopes could he fill? Would he have any seals left over? How many?

Subtract 31's, one at a time, as in box A. Why will this take even longer than the work in box A?

Build a multiplication table of 31's. Did you build a longer table than in box B? Why? How far did you go?

D

Write this:

$$\begin{array}{r} 6,\ \text{R}12 \\ 31\overline{)198} \\ \underline{186}\ (6 \times 31) \\ 12 \end{array}$$

Think this:

$$\begin{array}{r} 6+ \\ 30\overline{)190} \end{array}$$

Why is it easiest of all to divide, as in box D?

To estimate the number of 31's that can be subtracted all at once, use the 30 in _?_ and the 190 in _?_.

30's in 190 (or 3's in 19) equal 6 and a remainder. Probably there are six 31's in 198.

Write 6, the estimate, in the quotient over the 8 of 198.

Test the estimate by multiplying. Six 31's = ?

Can six 31's, or 186, be subtracted at one time?

Why should the remainder be smaller than the divisor, 31?

Jerry could put 31 seals in each of _?_ envelopes. This would use up _?_ of his seals. He would have _?_ seals left.

3. On the board, try to find by division how many envelopes you would need if you had 147 seals and put 21 in each envelope.

Finding Products

Readiness for division [W]

On folded paper, write only the products.

	a	b	c	d	e	f
1. Multiply by 4:	36	75	59	84	48	97
2. Multiply by 6:	47	29	78	56	65	83
3. Multiply by 7:	93	76	84	69	58	45
4. Multiply by 8:	72	90	68	93	57	86

Using the Division Steps with Two-place Divisors

No carrying or borrowing [O]

1. Compare these steps with those for one-place divisors:

Divide. What do you think to find the quotient figure for Ex. A? Where is the 4 written? Why?

Multiply and compare to test the quotient. 4 × 62 = ? The product should not be larger than the dividend. Is it?

Subtract and compare. 259 − 248 = ? The remainder number should be smaller than the divisor. Is it?

A

Divide ⟶
$$\begin{array}{r} 4 \\ 62\overline{)259} \end{array}$$

Multiply and Compare ⟶
$$\begin{array}{rl} 4 & \\ 62\overline{)259} & \\ \underline{248} & (4 \times 62) \end{array}$$

Subtract and Compare ⟶
$$\begin{array}{rl} 4, & \text{R11} \\ 62\overline{)259} & \\ \underline{248} & (4 \times 62) \\ 11 & \end{array}$$

Is the division finished? Yes, so you write the remainder, 11, as R11 beside the quotient.

2. Can you check the answer for Ex. 1 by adding? Try it. 62 + 62 + 62 + 62 + 11 = ?

Why is it better to check as in box B?

B

Check

$$\begin{array}{r} 62 \\ \underline{\times 4} \\ 248 \\ \underline{+11} \\ 259 \end{array}$$

3. Tell how the quotient figures were estimated in row 4 below. For 4a say, "80's in 370, or 8's in 37, = 4 and a reminder. Probably there are four 82's in 379."

Then explain how to estimate quotients in rows 5 to 7.

[W]

Copy, divide, and check in rows 4 to 7.

	a	b	c	d	e	f
4.	$\begin{array}{r}4\\82\overline{)379}\end{array}$	$\begin{array}{r}2\\42\overline{)97}\end{array}$	$\begin{array}{r}3\\52\overline{)178}\end{array}$	$\begin{array}{r}6\\51\overline{)348}\end{array}$	$\begin{array}{r}8\\91\overline{)739}\end{array}$	$\begin{array}{r}\$3\\73\overline{)\$249}\end{array}$
5.	$93\overline{)279}$	$23\overline{)69}$	$41\overline{)298}$	$92\overline{)299}$	$62\overline{)278}$	$71\overline{)\$378}$
6.	$94\overline{)188}$	$34\overline{)78}$	$73\overline{)259}$	$91\overline{)819}$	$53\overline{)169}$	$84\overline{)\$189}$
7.	$83\overline{)166}$	$74\overline{)96}$	$50\overline{)420}$	$63\overline{)199}$	$74\overline{)148}$	$90\overline{)\$546}$

Borrowing in the Subtraction Step

No carrying [O]

Say the quotients for row 1. Four examples have mistakes in the subtraction step. Find and tell how to correct the mistakes.

	a	b	c	d	e	f
	?	?	?	?	?	?
1.	61)453	87)110	71)545	93)352	72)342	81)606
	427	87	497	279	288	567
	36	37	47	73	54	49

[W]

Copy, divide, and check by multiplying.

2. 94)251 81)703 63)200 41)376 72)265 61)$529

3. 91)584 82)362 91)809 93)294 81)554 73)$205

4. 64)134 92)447 53)180 61)400 32)136 34)$70

5. Paper napkins at school come in packages of 40 each. How many full packages and how many napkins from another package are needed to give one napkin each to

a. 175 children? **b.** 268 children? **c.** 387 children?

6. A school lunchroom uses an average of 70 lb. of sugar a week. How many whole weeks will three 100-pound bags last?

7. A school of 14 rooms averages 32 pupils per room. Are there 450 pupils in all? How many more or less than 450?

Extra Practice. Work Sets 41 and 42.

Carrying in the Multiplication Step

2-place divisors; carrying and borrowing [W]

On your paper, copy and finish the work in box A. Then check your division by subtracting 78's one at a time.

If you cannot find correct quotients without writing the steps in box B (or others), write them neatly as side work.

A

$$\begin{array}{r}4\\ 78\overline{)325}\\ 312\\ \hline ??\end{array}$$

B

Think these steps:

$$\begin{array}{r}4^{+}\\ 70\overline{)320}\end{array} \qquad \begin{array}{r}78\\ \times 4\\ \hline 312\end{array}$$

Copy, divide, and check.

	a	b	c	d	e	f
1.	$65\overline{)399}$	$48\overline{)149}$	$32\overline{)298}$	$47\overline{)238}$	$65\overline{)295}$	$95\overline{)857}$
2.	$94\overline{)479}$	$87\overline{)609}$	$62\overline{)399}$	$92\overline{)759}$	$68\overline{)234}$	$82\overline{)738}$
3.	$73\overline{)589}$	$84\overline{)508}$	$56\overline{)392}$	$94\overline{)398}$	$97\overline{)699}$	$78\overline{)624}$

➤ **Extra Practice.** Work Set 43.

Both Carrying and Borrowing in Division Examples

[W]

Copy, divide, and check. Write the side-work steps only if you need to.

1.	$64\overline{)411}$	$96\overline{)442}$	$85\overline{)624}$	$94\overline{)801}$	$66\overline{)412}$	$93\overline{)\$606}$
2.	$92\overline{)610}$	$86\overline{)301}$	$97\overline{)803}$	$84\overline{)631}$	$74\overline{)620}$	$53\overline{)\$492}$
3.	$62\overline{)593}$	$42\overline{)395}$	$56\overline{)343}$	$65\overline{)92}$	$85\overline{)313}$	$76\overline{)\$456}$
4.	$87\overline{)791}$	$72\overline{)551}$	$86\overline{)712}$	$94\overline{)803}$	$75\overline{)681}$	$96\overline{)\$344}$

5. A parking lot has spaces for 34 cars in each row. How many rows are filled when the lot has 136 cars in it? 238 cars?

6. If 42 cans fill one shelf, how many shelves must be used for 252 cans? for 336 cans?

➤ **Extra Practice.** Work Set 44.

So You Won't Forget!

Review of fraction meanings [O]

a. $\frac{5}{4}$ **b.** $\frac{9}{8}$ **c.** $\frac{4}{5}$ **d.** $\frac{5}{8}$ **e.** $\frac{7}{3}$ **f.** $\frac{3}{4}$ **g.** $\frac{5}{6}$ **h.** $\frac{3}{3}$

1. Which fractions in the box mean 1 whole or more than 1 whole? How can you tell? Are these proper or improper fractions? Tell how they can be changed.

2. Which fraction above equals $2\frac{1}{3}$? Prove it.

3. In which fractions above is the fractional unit $\frac{1}{8}$? $\frac{1}{3}$?

4. Which of the fractions above means $5 \div 6$? $4 \div 5$? 9 divided by 8? $3 \div 4$? 5 divided by 4?

5. Read the fractions in the box which have 3 as the numerator; 4 as the denominator.

6. Count by $\frac{1}{5}$'s from $\frac{1}{5}$ to 2. Write this on the board.

7. For each of the following groups, say the fractions in order from smallest to largest: **a.** $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{2}$ $\frac{1}{10}$ $\frac{1}{6}$ **b.** $\frac{4}{5}$ $\frac{4}{9}$ $\frac{4}{3}$ $\frac{4}{2}$ $\frac{4}{16}$

8. Are $\frac{5}{16}$, $\frac{7}{16}$, and $\frac{3}{16}$ like- or unlike-fractions? Why?

9. Say four unlike-fractions which have 3 as the numerator.

10. How many more ounces are there in $\frac{1}{2}$ lb. than in $\frac{1}{8}$ lb.?

Watch the Signs!

Cumulative review of A., S., M., D. [W]

Copy and work. Check each answer.

	a	b	c	d	e
1.	$8\overline{)392}$	$\begin{array}{r}273\\ \times 8\\ \hline\end{array}$	$\begin{array}{r}\$14.25\\ \times 6\\ \hline\end{array}$	$\begin{array}{r}700\\ -54\\ \hline\end{array}$	$9\overline{)\$24.57}$
2.	$60\overline{)420}$	$\begin{array}{r}75\\ \times 30\\ \hline\end{array}$	$\begin{array}{r}\$0.59\\ \times 98\\ \hline\end{array}$	$\begin{array}{r}7{,}030\\ -2{,}476\\ \hline\end{array}$	$40\overline{)275}$
3.	$34\overline{)170}$	$\begin{array}{r}\$72.13\\ -9.58\\ \hline\end{array}$	$\begin{array}{r}708\\ \times 46\\ \hline\end{array}$	$\begin{array}{r}\$140.05\\ -89.16\\ \hline\end{array}$	$53\overline{)274}$

Problems about Rate and Time

Multiplicand-multiplier-product relationship in problems [O]

1. Bob, Jim, and Tom each worked 7 hr. one Saturday. Bob was paid 50¢ an hour, Jim was paid 65¢ an hour, and Tom was paid 60¢ an hour. What was the total amount each boy earned?

The amount each boy is paid for 1 hr. is his hourly rate of pay. Why was the total amount earned different for each boy?

2. Mary, Alice, and Helen are each paid 65¢ an hour for baby sitting. One week Mary worked 3 hr., Alice worked 6 hr., and Helen, 5 hr. What amount did each girl earn that week?

In problems 1 and 2, the total earned depends on the rate of pay (amount paid per hour) and the time worked (hours).

Total amount = Rate × Time.

3. Mr. Day drives at an average rate of 45 mi. an hour. How far will he travel in 4 hr.? in 6 hr.? in 9 hr.? in 12 hr.? On what does the total distance depend each time?

4. Mr. Sand's average rate is 38 mi. per hour, Mr. Turner's is 48 mi., and Mr. Smith's is 42 mi. In 7 hr. of driving time, what distance will each man go?

In Ex. 3 and 4, the total distance depends on the rate of motion (miles per hour) and the time spent (number of hours).

Distance = Rate (miles per hour) × Time (hours).

In problems 1–4, you had two factors given (rate and time) and you had to find the product. In the problems below, you have the product and one factor given. Tell how to find the missing factor in each problem. Do not solve yet.

5. In 6 weeks, Sally saved $1.92, Ann saved $2.70, and Betty saved $2.10. Find each girl's weekly rate of savings.

6. In 3 min., Bob can say 96 division facts; Sam, 72 facts; and Harry, 87 facts. What is the rate per minute for each boy?

7. If Mr. Barnes drives at the rate of 40 mi. an hour and Mr. Gates drives at the rate of 50 mi., how long will it take each man to drive 200 mi.?

8. If Douglas walks at the rate of 60 yd. a minute, how long will it take him to walk 180 yd.? 480 yd.?

9. Tom earns an average of $6 a month, Jim $5, and Bob $8. At this rate, how many months will it take each to earn $120?

10. How many days will it take Jim to read a book of 240 pages if he reads at the rate of 10 pages a day? 20 pages a day?

[W]

Now go back and solve problems 1–10.

11. Make and work problems using the facts in rows a to d.

	Time	**Rate**	**Total amount earned, spent, or saved**
a.	20 wk.	$30 a week	_?_ spent
b.	8 mo.	_?_ a month	$3,200 earned
c.	_?_ da.	20¢ a day	80¢ saved
d.	8 hr.	$1.50 an hour	_?_ earned

12. If you know two factors, how do you find their product?

13. In which rows do you know the product and one factor? How do you find the other factor?

Costumes for a Party

A. and S. of mixed numbers; no carrying or borrowing [O]

1. Mother made clown costumes for Sharon and Roger. Sharon's costume took $3\frac{1}{8}$ yards of material and Roger's, $4\frac{3}{8}$ yards. How many yards did both costumes take? How many more yards of material did Roger's costume take than Sharon's?

Try to find answers for both questions before you read on.

What kind of numbers must be added to find the number of yards in both costumes?

In box A, we add first the fractions, then the whole numbers: $\frac{1}{8} + \frac{3}{8} = \frac{?}{8}$ $\quad 3 + 4 = ?$

Would you give the answer as $7\frac{4}{8}$ yd.? No; $\frac{4}{8} = \frac{?}{2}$, so we change $7\frac{4}{8}$ to $7\frac{1}{2}$.

In box B, we compare $4\frac{3}{8}$ with $3\frac{1}{8}$. What process do we use? Explain the subtraction. Why do we change $1\frac{2}{8}$ to $1\frac{1}{4}$?

A

$$\begin{array}{r} 3\frac{1}{8} \\ +4\frac{3}{8} \\ \hline 7\frac{4}{8} = 7\frac{1}{2} \end{array}$$

B

$$\begin{array}{r} 4\frac{3}{8} \\ -3\frac{1}{8} \\ \hline 1\frac{2}{8} = 1\frac{1}{4} \end{array}$$

Explain the examples in row 2. Notice that we do not write a zero in the answer in the fraction column of Ex. 2a and of Ex. 2d or in the one's column of Ex. 2b.

$$\begin{array}{lccccc} & \textbf{a} & \textbf{b} & \textbf{c} & \textbf{d} & \textbf{e} \\ \textbf{2.} & \begin{array}{r} 6\frac{3}{4} \\ -1\frac{3}{4} \\ \hline 5 \end{array} & \begin{array}{r} 3\frac{7}{8} \\ -3\frac{1}{8} \\ \hline \frac{6}{8} = \frac{3}{4} \end{array} & \begin{array}{r} 6\frac{7}{8} \\ -\frac{3}{8} \\ \hline 6\frac{4}{8} = 6\frac{1}{2} \end{array} & \begin{array}{r} 7\frac{1}{2} \\ -\frac{1}{2} \\ \hline 7 \end{array} & \begin{array}{r} 9\frac{5}{6} \\ -2 \\ \hline 7\frac{5}{6} \end{array} \end{array}$$

Say the answers for rows 3 and 4. Tell what you think.

[W]

Now copy and work rows 3–6.

	a	b	c	d	e	f
3.	$\begin{array}{r} 5\frac{1}{3} \\ \underline{+6\frac{1}{3}} \end{array}$	$\begin{array}{r} 7\frac{1}{4} \\ \underline{+9\frac{1}{4}} \end{array}$	$\begin{array}{r} 17\frac{5}{8} \\ \underline{-9\frac{3}{8}} \end{array}$	$\begin{array}{r} 3\frac{2}{5} \\ \underline{-2\frac{1}{5}} \end{array}$	$\begin{array}{r} 4\frac{2}{5} \\ \underline{+8\frac{2}{5}} \end{array}$	$\begin{array}{r} 1\frac{3}{8} \\ \underline{+7\frac{3}{8}} \end{array}$
4.	$\begin{array}{r} 5\frac{9}{10} \\ \underline{-2\frac{3}{10}} \end{array}$	$\begin{array}{r} 7\frac{5}{6} \\ \underline{-1\frac{5}{6}} \end{array}$	$\begin{array}{r} 8\frac{1}{12} \\ \underline{+\frac{5}{12}} \end{array}$	$\begin{array}{r} 9\frac{7}{16} \\ \underline{+8\frac{3}{16}} \end{array}$	$\begin{array}{r} 4\frac{11}{12} \\ \underline{-4\frac{5}{12}} \end{array}$	$\begin{array}{r} 6\frac{4}{5} \\ \underline{-\frac{2}{5}} \end{array}$
5.	$\begin{array}{r} 10\frac{3}{4} \\ \underline{-6\frac{1}{4}} \end{array}$	$\begin{array}{r} 13\frac{2}{3} \\ \underline{-5\frac{1}{3}} \end{array}$	$\begin{array}{r} 7\frac{2}{5} \\ \underline{+8\frac{1}{5}} \end{array}$	$\begin{array}{r} 5\frac{1}{8} \\ \underline{+9\frac{5}{8}} \end{array}$	$\begin{array}{r} 12\frac{7}{8} \\ \underline{-4\frac{3}{8}} \end{array}$	$\begin{array}{r} 9\frac{5}{6} \\ \underline{-2\frac{1}{6}} \end{array}$
6.	$\begin{array}{r} 8\frac{9}{16} \\ \underline{+7\frac{5}{16}} \end{array}$	$\begin{array}{r} \frac{7}{10} \\ \underline{+2\frac{1}{10}} \end{array}$	$\begin{array}{r} 5\frac{2}{3} \\ \underline{-\frac{2}{3}} \end{array}$	$\begin{array}{r} 8\frac{3}{4} \\ \underline{-6} \end{array}$	$\begin{array}{r} 3\frac{5}{16} \\ \underline{+8\frac{1}{16}} \end{array}$	$\begin{array}{r} \frac{7}{12} \\ \underline{+4\frac{1}{12}} \end{array}$

Extra Practice. Work Set 45.

n, the Missing Quotient or Divisor

[O]

1. a. 48 ÷ 6 = n; **b.** 490 ÷ 7 = n; **c.** 2,295 ÷ 85 = n

Tell what to do in Ex. 1 to find *n*, the missing quotient.

2. a. 48 ÷ n = 8; **b.** 490 ÷ n = 70; **c.** 2,295 ÷ n = 27

In Ex. 2a, *n* is the missing divisor. We know that 8 × *n* = 48, so we think of 48 as a product with 8 and *n* as factors.

When we know a product and one factor, how can we find the missing factor? 48 ÷ 8 = n

Explain how to find *n*, the missing divisor, in Ex. 2b and 2c.

[W]

Write the work to find *n*, the missing quotient or divisor in rows 3–5. For Ex. 3a write, "9 × n = 72; n = 72 ÷ 9, or 8."

	a	b	c
3.	72 ÷ n = 9	63 ÷ 7 = n	56 ÷ n = 7
4.	332 ÷ 83 = n	468 ÷ n = 78	224 ÷ 56 = n
5.	219 ÷ n = 73	581 ÷ 83 = n	225 ÷ n = 75

Shopping for Meat

Adding mixed numbers with carrying [O]

1. Sally did the shopping today. She bought beef weighing $3\frac{7}{8}$ lb. and pork weighing $4\frac{3}{8}$ lb., or _?_ lb. of meat in all.

In box A, what is the sum of the fractions? What is the sum of the whole numbers?

Is $\frac{10}{8}$ more than 1 whole? How much more? $\frac{10}{8} = 1\frac{?}{8}$

Then $7 + 1\frac{2}{8} = 8\frac{?}{8}$, or $8\frac{?}{4}$. Why do we change $8\frac{2}{8}$ to $8\frac{1}{4}$?

A	B
$\begin{array}{r} 3\frac{7}{8} \\ +4\frac{3}{8} \\ \hline 7\underset{\uparrow}{\frac{10}{8}} \end{array} = 7 + \underset{\uparrow}{1\frac{2}{8}} = 8\frac{2}{8} = 8\frac{1}{4}$	$\begin{array}{r} 3\frac{1}{2} \\ +2\frac{1}{2} \\ \hline 5\underset{\uparrow}{\frac{2}{2}} \end{array} = 5 + \underset{\uparrow}{1} = 6$

2. In box B, we change the mixed number $5\frac{2}{2}$ to _?_. Why?

3. Study Bill's, Ann's, and Harry's work for $\frac{3}{4} + 2\frac{3}{4}$.

Bill	Ann	Harry
$\begin{array}{r} \frac{3}{4} \\ +2\frac{3}{4} \\ \hline 2\frac{6}{4} \end{array}$	$\begin{array}{r} \frac{3}{4} \\ +2\frac{3}{4} \\ \hline 2\frac{6}{4} \end{array} = 2 + 1\frac{2}{4} = 3\frac{2}{4} = 3\frac{1}{2}$	$\begin{array}{r} \frac{3}{4} \\ +2\frac{3}{4} \\ \hline 2\frac{6}{4} \end{array} = 3\frac{1}{2}$

What should Bill have done with the improper fraction, $\frac{6}{4}$, in his answer? Why? $\frac{6}{4}$ equals what mixed number?

Which steps did Harry work in his head?

Why does Ann's work help you best to explain the steps?

Tell how to finish these examples, using all of Ann's steps:

	a	b	c	d	e
4.	$2\frac{5}{8}$	$4\frac{3}{5}$	$\frac{7}{10}$	$6\frac{2}{3}$	$5\frac{3}{4}$
	$+4\frac{7}{8}$	$+2\frac{2}{5}$	$+4\frac{9}{10}$	$+8\frac{2}{3}$	$+\frac{1}{4}$
	$6\frac{12}{8} = ?$	$6\frac{5}{5} = ?$	$4\frac{16}{10} = ?$	$14\frac{4}{3} = ?$	$5\frac{4}{4} = ?$

[W]

Solve problems 5 to 15. In adding mixed numbers, show all the steps Ann did. Check each answer by an estimate.

5. Mrs. Day bought two chickens. One weighed $5\frac{3}{4}$ lb. and the other weighed $3\frac{1}{4}$ lb. How much did both chickens weigh together?

6. In Ex. 5 how much more did one of the chickens weigh than the other one?

7. At 45¢ a pound, how much did the chickens (Ex. 5) cost?

8. Bob bought $\frac{3}{4}$ lb. of ground beef and $1\frac{3}{4}$ lb. of pork chops. How many pounds of meat did he buy?

9. The meatman had a piece of bacon weighing $2\frac{7}{8}$ lb. He cut off $\frac{5}{8}$ lb. How many pounds of bacon were left in the piece?

10. Mrs. Barnes bought 2 slices of round steak. One slice weighed $1\frac{7}{8}$ lb. and the other slice weighed $1\frac{3}{8}$ lb. How many pounds did both slices weigh together?

11. In Ex. 10 how much less did one slice of steak weigh than the other?

12. At 86¢ a pound, how much does $\frac{1}{2}$ lb. of bacon cost?

13. Which costs more, $\frac{1}{2}$ lb. of sausage at 64¢ a pound or $\frac{1}{4}$ lb. of boiled ham at 96¢ a pound? How much more?

14. Some Scouts planned to have $4\frac{1}{2}$ lb. of hamburger for their campfire cookout. Tom brought $\frac{3}{4}$ lb. and Jim brought $1\frac{3}{4}$ lb. How many more pounds were needed to make $4\frac{1}{2}$ lb.?

15. If hamburger costs 60¢ a pound, find the cost of 4 lb.; the cost of $\frac{1}{2}$ lb.; the cost of $4\frac{1}{2}$ lb.

Practice with Mixed Numbers

[W]

Copy and add. Use your fraction charts or those on pages 108, 110, and 111 to help you write answers in best form.

	a	b	c	d	e	f	g
1.	$4\frac{2}{3}$ $2\frac{2}{3}$	$7\frac{4}{5}$ $3\frac{2}{5}$	$7\frac{3}{4}$ $5\frac{1}{4}$	$4\frac{7}{8}$ $3\frac{5}{8}$	$9\frac{5}{6}$ $7\frac{5}{6}$	$14\frac{7}{10}$ $8\frac{3}{10}$	$2\frac{1}{6}$ $\frac{1}{6}$
2.	$3\frac{7}{8}$ $2\frac{7}{8}$	$7\frac{2}{3}$ $4\frac{1}{3}$	$6\frac{1}{4}$ $3\frac{1}{4}$	$4\frac{5}{8}$ $\frac{3}{8}$	$8\frac{3}{5}$ $4\frac{3}{5}$	$7\frac{9}{10}$ $4\frac{7}{10}$	$11\frac{5}{8}$ $3\frac{5}{8}$
3.	$3\frac{1}{2}$ $4\frac{1}{2}$ $6\frac{1}{2}$	$5\frac{2}{3}$ $1\frac{1}{3}$ $4\frac{1}{3}$	$2\frac{5}{8}$ $\frac{7}{8}$ $1\frac{3}{8}$	$2\frac{1}{6}$ 3 $4\frac{5}{6}$	$5\frac{1}{4}$ $2\frac{1}{4}$ $1\frac{3}{4}$	$1\frac{3}{5}$ $2\frac{4}{5}$ $4\frac{2}{5}$	$\frac{3}{4}$ $2\frac{3}{4}$ $1\frac{1}{4}$

Now copy the examples in rows 1 and 2 above and subtract.

Right or Wrong? Prove It!

Review of meanings [O]

Do you agree with the statements these children made? Tell why you do or do not agree.

1. Helen: Five 3-ounce boxes of cereal weigh 1 lb.

2. Jack: I spent 73¢ and received a quarter and 2 cents in change from a dollar bill.

3. Ann: I needed 4 grapefruit to serve one half of a grapefruit to each of 8 people.

4. Jean: I want to serve one quarter of a melon to each of 9 people. It will take $2\frac{3}{4}$ melons.

5. Betty: $\frac{3}{4}$ yd. of lace is half as long a piece as $\frac{3}{8}$ yd.

6. Tom: $\frac{3}{8}$, $\frac{3}{4}$, $\frac{3}{10}$, and $\frac{3}{16}$ are like-fractions because they all have 3 as the numerator.

7. Sally: The Roman number for 31 is XXIX.

8. Mary: I can exchange 40 nickels for two $1 bills.

Do You Earn and Save Money?

Estimating in M. [O]

Use rounded numbers and estimate the answer for the first question in each problem below.

1. Bill has put $2.85 in the bank each week for 20 weeks. Has he put enough money in the bank to buy a bicycle which costs $67.50? What is the difference between the amount he has saved and the cost of the bicycle?

2. Jim sold 16 magazine subscriptions at $3.75 each. Did he take in more or less than $70? How much more or less?

3. Bob expects to pay $50 for his vacation at a camp next summer. He has saved $7.50 a month for 6 months. Has he saved more or less than the amount he needs for camp? How much more or less?

4. Tom works at a market on Saturdays. He earns 75¢ an hour. During one month he worked 24 hr. If he saved half the money he earned, did he save more or less than $12? How much more or less?

5. On Monday, Helen and her mother picked 16 qt. of strawberries and sold them at 48¢ a quart. On Thursday, they picked 20 qt. and sold them at 40¢ a quart. On which day did they take in more money? How much more?

[W]

Now find the exact answer for each question above.

Subtracting a Fraction from a Whole Number

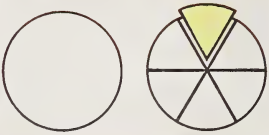
Meaning [O]

1. Fred's mother baked 2 pies. She put $\frac{1}{6}$ of a pie in Fred's lunch box. Then _?_ pies were left.

Box A shows how Fred's mother cut 1 pie into $\frac{?}{6}$ so she could give Fred $\frac{1}{6}$. $\frac{1}{6}$ (colored) from $1\frac{6}{6} = 1\frac{?}{6}$. Then $\frac{1}{6}$ from $2 = 1\frac{?}{6}$

Explain the subtraction and the check in box B. What is the fractional unit for the pie that was cut?

A



B

$$\begin{array}{rcr} 2 & = & 1\frac{6}{6} \\ -\frac{1}{6} & = & \frac{1}{6} \\ \hline & & 1\frac{5}{6} \end{array}$$

Check

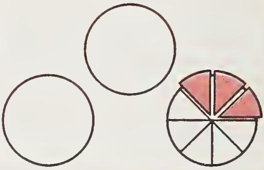
$$\begin{array}{r} 1\frac{5}{6} \\ +\frac{1}{6} \\ \hline 1\frac{6}{6} = 2 \end{array}$$

2. Mary's mother made 3 pies. That night, $\frac{3}{8}$ of one pie was left. How many pies had been eaten?

In box C, $3 = 2\frac{?}{8}$. $\frac{3}{8}$ from $2\frac{8}{8}$ = ? Then $\frac{3}{8}$ from 3 = ?

On the board, copy and finish the work in box D. What is the fractional unit for the pie that was cut?

C



D

$$\begin{array}{rcr} 3 & = & 2\frac{8}{8} \\ -\frac{3}{8} & = & \frac{3}{8} \\ \hline \end{array}$$

Check

$$\begin{array}{r} 2\frac{5}{8} \\ +\frac{3}{8} \\ \hline \end{array}$$

3. Why did we change 1 whole to $\frac{6}{6}$ in box B and to $\frac{8}{8}$ in box D?

4. Tell what change to make in 1 whole before we can subtract the fractions in Ex. E to G.

E	F	G
$\begin{array}{r} 2 \\ -\frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} 3 \\ -\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 1 \\ -\frac{7}{8} \\ \hline \end{array}$

To subtract a fraction from a whole number, first change 1 whole to a fraction with the same fractional unit as that in the fraction to be subtracted.

[W]

5. For Ex. E to G draw circles. Shade the parts subtracted.

6. Copy and work Ex. E to G.

7. From 1 whole, subtract **a.** $\frac{2}{3}$; **b.** $\frac{3}{10}$; **c.** $\frac{1}{5}$; **d.** $\frac{4}{5}$; **e.** $\frac{1}{2}$.

Subtracting a Mixed Number from a Whole Number

Borrowing from the whole number [O]

1. Chuck used $2\frac{3}{4}$ yd. of rope from a piece which was 6 yd. long. How many yards did he have left?

Box A. In the fraction column we need some fourths from which to subtract 3 fourths ($\frac{3}{4}$).

We get the fourths we need by changing 1 of the 6 wholes to $\frac{?}{4}$. Then we have $5\frac{?}{4}$.

$2\frac{3}{4}$ from $5\frac{4}{4} = ?$ How many yards were left?

A

$$\begin{array}{rcl} 6 & = & 5\frac{4}{4} \\ -2\frac{3}{4} & = & 2\frac{3}{4} \\ \hline & & 3\frac{1}{4} \end{array}$$

2. Explain and finish the work in box B.

B

$$\begin{array}{rcl} 12 & = & 11\frac{5}{5} \\ -8\frac{3}{5} & = & 8\frac{3}{5} \\ \hline \end{array}$$

To subtract a mixed number from a whole number, borrow from the whole number.

3. Tell the missing numerators: $7 = 6\frac{?}{8}$; $5 = 4\frac{?}{3}$; $8 = 7\frac{?}{10}$.

4. In which examples below can we subtract in the fraction column without first changing 1 whole to a fraction? Why?

[W]

Copy and subtract, as in boxes A and B above.

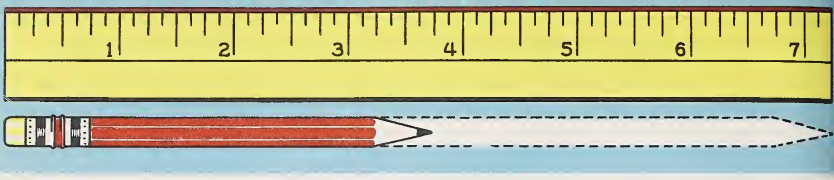
	a	b	c	d	e	f
5.	7 $-2\frac{3}{5}$	$14\frac{5}{6}$ $-8\frac{5}{6}$	9 $-2\frac{3}{8}$	4 $-2\frac{1}{2}$	$12\frac{7}{8}$ $-3\frac{5}{8}$	4 $-\frac{7}{10}$
6.	$11\frac{4}{5}$ $-8\frac{1}{5}$	13 $-4\frac{5}{8}$	4 $-\frac{5}{6}$	$4\frac{7}{8}$ $-1\frac{7}{8}$	8 $-4\frac{2}{3}$	$3\frac{5}{9}$ $-3\frac{1}{9}$

To Keep in Practice in Division

[W]

Copy, divide, and check.

	a	b	c	d	e
1.	$9\overline{)\$7.02}$	$6\overline{)1{,}842}$	$8\overline{)7{,}507}$	$7\overline{)3{,}435}$	$8\overline{)\$567.68}$
2.	$80\overline{)756}$	$90\overline{)824}$	$70\overline{)593}$	$61\overline{)488}$	$52\overline{)364}$
3.	$58\overline{)348}$	$74\overline{)597}$	$95\overline{)590}$	$84\overline{)709}$	$67\overline{)352}$



Subtracting from a Mixed Number

Like-fractions; borrowing [O]

1. When Bill bought a new wooden pencil, it was $7\frac{1}{4}$ in. long. After a month, it was $3\frac{3}{4}$ in. long. How much of his pencil had Bill used up?

$$\begin{array}{r} 7\frac{1}{4} = 6\frac{5}{4} \\ -3\frac{3}{4} = 3\frac{3}{4} \\ \hline 3\frac{2}{4} = 3\frac{1}{2} \end{array}$$

Can you find the answer by looking at the picture?

Try to explain the subtraction in the box before reading on.

In the fraction column we need more fourths because $\frac{3}{4}$ can't be taken from $\frac{1}{4}$.

To get more fourths, we change one of the 7 wholes to $\frac{?}{4}$ and add it to the $\frac{1}{4}$. Then we have $6\frac{?}{4}$ and can subtract. $3\frac{3}{4}$ from $6\frac{5}{4} = ?$ $3\frac{2}{4} = 3\frac{?}{2}$ Why is $3\frac{1}{2}$ better form for the answer than $3\frac{2}{4}$?

Give the missing numbers in rows 2 and 3. First think the answer, then check by using the number line on the ruler above.

	a	b	c	d
2.	$2\frac{1}{4} = 1\frac{?}{4}$	$2\frac{7}{8} = 1\frac{?}{8}$	$3\frac{1}{8} = 2\frac{?}{8}$	$2\frac{3}{8} = 1\frac{?}{8}$
3.	$5\frac{5}{8} = 4\frac{?}{8}$	$5\frac{3}{4} = 4\frac{?}{4}$	$6\frac{1}{2} = 5\frac{?}{2}$	$3\frac{1}{4} = 2\frac{?}{4}$

Explain how each example in row 4 was changed to make the subtraction possible.

4.

a
$$\begin{array}{r} 9\frac{1}{6} = 8\frac{7}{6} \\ -3\frac{5}{6} = 3\frac{5}{6} \\ \hline 5\frac{2}{6} = 5\frac{1}{3} \end{array}$$

b
$$\begin{array}{r} 7\frac{3}{5} = 6\frac{8}{5} \\ -6\frac{4}{5} = 6\frac{4}{5} \\ \hline \frac{4}{5} \end{array}$$

c
$$\begin{array}{r} 4\frac{3}{8} = 3\frac{11}{8} \\ -\frac{5}{8} = \frac{5}{8} \\ \hline 3\frac{6}{8} = 3\frac{3}{4} \end{array}$$

In which examples in row 5 can we subtract in the fraction column without first changing one whole to fractional parts?

Tell what change to make in each of the other examples.

	a	b	c	d	e	f
5.	$6\frac{3}{4}$	$5\frac{3}{8}$	$4\frac{1}{3}$	$8\frac{9}{10}$	$9\frac{2}{5}$	$3\frac{5}{6}$
	$2\frac{1}{4}$	$1\frac{7}{8}$	$2\frac{2}{3}$	$3\frac{7}{10}$	$2\frac{4}{5}$	$2\frac{1}{6}$

[W]

In rows 5 to 7, copy the examples and subtract. Use your fraction charts to help you change the answers to best form.

6.	$2\frac{1}{8}$	$1\frac{1}{6}$	$4\frac{1}{3}$	$7\frac{9}{10}$	$3\frac{1}{4}$	8
	$1\frac{3}{8}$	$\frac{5}{6}$	$1\frac{2}{3}$	$2\frac{3}{10}$	$2\frac{3}{4}$	$5\frac{4}{5}$
7.	$6\frac{3}{8}$	$5\frac{3}{8}$	$4\frac{3}{10}$	$7\frac{1}{5}$	$8\frac{1}{2}$	$9\frac{3}{5}$
	$2\frac{7}{8}$	$2\frac{7}{8}$	$2\frac{9}{10}$	$\frac{3}{5}$	$4\frac{1}{2}$	$7\frac{4}{5}$

8. Make number-line drawings to prove that your answers for Ex. a, b, and c in row 6 are correct.

9. Copy the examples in rows 5 to 7 again and add.

Like-fractions in A. and S. problems

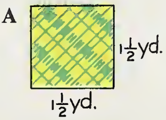
10. Joe had a board 8 feet long. He sawed off a piece $4\frac{1}{4}$ feet long to make one shelf, and a piece $3\frac{1}{4}$ feet long for another shelf. How much of the board did he use for the two shelves? How many feet of board did he have left?

11. Mary's apron pattern calls for $1\frac{2}{3}$ yd. of lace. Is 3 yd. of edging enough to make 2 aprons? Why?

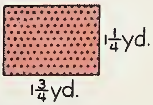
12. Jean used $1\frac{3}{4}$ yd. of ribbon from a piece $3\frac{1}{4}$ yd. long. How long was the piece that Jean had left?

13–14. How many yards of binding are needed to go around the edge of table cover A? of B?

A


$1\frac{1}{2}$yd.
$1\frac{1}{2}$yd.

B


$1\frac{1}{4}$yd.
$1\frac{3}{4}$yd.

15. Tom planned to work in the garden for 3 hr. If he has worked $1\frac{3}{4}$ hr., how much longer should he work?

Harvest Time at a Farm

Using measures [W]

After a visit to his uncle's farm, Carl made up these problems. See if you can work them.

1. One morning 6 men picked 234 bu. of apples. This was an average of how many bushels per man?

2. On Monday, Uncle Jim sold 87 bu. of apples at $2.75 a bushel. How much did he get for them?

3. On Tuesday, a man from the city paid my uncle $26.55 for 9 bu. of apples. How much was this a bushel?

4. Apples weigh 50 lb. per bushel. What is the weight of the apples my uncle sold on Monday and Tuesday? (See Ex. 2 and Ex. 3.) Is this more or less than 2 tons? (2,000 lb. = 1 ton)

5. A bushel of potatoes weighs 60 lb. Do 20 bu. of potatoes weigh more or less than $\frac{1}{2}$ ton?

6. Two bushels of grapes will fill how many peck baskets? How much will each peck weigh? (1 bu. of grapes weighs 48 lb.)

7. Aunt Kate sold 3 turkeys weighing $13\frac{1}{4}$ lb., 15 lb., and $16\frac{3}{4}$ lb. At 52¢ a pound, how much did she receive for them?

Mixed Numbers in Problems

Like-fractions [W]

1. The weather bureau reported that the snowfall on Monday was $5\frac{1}{2}$ inches; on Tuesday, 4 inches; and on Wednesday, $2\frac{1}{2}$ inches. What was the average snowfall per day?

2. Peter worked $3\frac{1}{4}$ hours shovelling snow on Monday and $2\frac{3}{4}$ hours on Tuesday. At 75¢ an hour, how much did he earn?

3. One morning the snow was 8 inches deep in the field beside Frank's house. By night it was only $5\frac{1}{2}$ inches deep. How many inches had the snow melted down during the day?

4. Janet mailed one package weighing $4\frac{3}{8}$ lb. and one weighing $1\frac{7}{8}$ lb. How much more did one package weigh than the other?

5. Ann's mother made one fruitcake weighing $2\frac{1}{8}$ lb. and one weighing $1\frac{7}{8}$ lb. Together they weighed how many pounds?

Practice with Mixed Numbers

S.; then A. [O]

Tell the whole-number part of each answer in rows 1 to 3. Then see how many complete answers you can tell.

[W]

Copy and subtract. Be sure your answers are in best form.

	a	b	c	d	e	f
1.	$8\frac{1}{12}$ $-3\frac{7}{12}$	$9\frac{7}{12}$ $-2\frac{5}{12}$	$9\frac{3}{10}$ $-5\frac{9}{10}$	$9\frac{7}{8}$ $-6\frac{7}{8}$	$17\frac{2}{5}$ $-8\frac{4}{5}$	11 $-8\frac{9}{16}$
2.	$10\frac{1}{6}$ $-7\frac{5}{6}$	$15\frac{1}{2}$ $-5\frac{1}{2}$	$15\frac{3}{8}$ $-4\frac{7}{8}$	$12\frac{7}{10}$ $-8\frac{3}{10}$	7 $-2\frac{5}{6}$	$20\frac{1}{4}$ $-16\frac{3}{4}$
3.	10 $-4\frac{3}{8}$	$7\frac{3}{16}$ $-2\frac{9}{16}$	$4\frac{2}{3}$ -2	$14\frac{1}{12}$ $-9\frac{7}{12}$	$10\frac{15}{16}$ $-9\frac{3}{16}$	$17\frac{7}{10}$ $-8\frac{9}{10}$

Now copy rows 1 to 3 without the signs and add.

➤ **Extra Practice.** Work Set 47.

Multiplying by Even Hundreds

Meaning [O]

1. Vera and her mother wrote 100 Christmas cards. How many seals is Vera putting on an envelope? How many will she need for 100 envelopes? 2 × 100 = 200, so 100 × 2 = ?

2. If Vera put 3 seals on each of 100 envelopes, how many seals would she need? 3 × 100 = 300, so 100 × 3 = ?

3. Read the following and tell a quick way to multiply a whole number by 100.

a. 100 × 8 = _?_ hundred, or 800

b. 100 × 16 = _?_ hundred, or 1,600

c. 100 × 85 = 8,500

d. 100 × 426 = 42,600

To multiply a whole number by 100, put two zeros at the right of the number.

4. Multiply each number below by 10, then by 100. Write only the products on the board.

a	b	c	d	e	f	g
97	624	800	204	831	80	300

5. Say the products for Ex. a to d below. Tell why the products for each pair should be the same.

a. 9 × 300 = _?_, so 300 × 9 = ?

b. 4 × 700 = _?_, so 700 × 4 = ?

c. 4 × 600 = _?_, so 600 × 4 = ?

d. 5 × 900 = _?_, so 900 × 5 = ?

Say products for rows 6 and 7 below in two ways. For Ex. 6a say, “6 hundred times 7 equals 42 hundred, or 4 thousand 2 hundred.”

	a	b	c	d
6.	600 × 7	700 × 8	700 × 3	600 × 8
7.	500 × 9	400 × 9	800 × 4	900 × 9

A	B
423	423
×3	×300
?	126,900

8. Tell the product for Ex. A.

9. In Ex. B, we write zeros in the product in _?_ place and in _?_ place, just as if we were multiplying by 1 hundred.

Next, we find 3 × 423. In what place is the 9 written? Why?

The product for Ex. B is _?_ times the product for Ex. A.

10. Find and tell the mistakes in Ex. d and e of row 11.

[W]

Copy and finish Ex. a to c in row 11. Then work Ex. d and e correctly on your paper.

	a	b	c	d	e
11.	315	836	589	968	279
	×700	×900	×300	×400	×300
	---500	---400	---700	38,720	837,000

Find the products for the following:

	a	b	c	d	e	f	g
12.	478	567	956	865	487	649	958
	×900	×400	×700	×600	×500	×800	×200
13.	783	395	419	596	847	348	936
	×800	×500	×300	×900	×700	×100	×400
14.	349	538	674	819	727	458	521
	×600	×300	×200	×700	×600	×400	×900

Three-Place Multipliers

[O]

1. Walter's father is a baker. One day he gave Walter this problem: "I baked bread on 324 days last year. I averaged 286 loaves a day. In all, did I bake more or less than 90,000 loaves last year?"

The parts of the multiplier (box A) are _?_ ones, _?_ tens, _?_ hundreds.

A	
286	*multiplicand*
×324	*multiplier*

Study the work in box B. Then tell these missing numbers:

In 4 days the baker made 4 × 286, or _?_ loaves.
In 20 days the baker made 20 × 286, or _?_ loaves.
In 300 days the baker made 300 × 286, or _?_ loaves.
In 324 days the baker made 324 × 286, or _?_ loaves.

B	C	D
Long way	**Short way**	**Check**
286	286	324
×324	×324	×286
1 144	1 144	1 944
5 720	5 72	25 92
85 800	85 8	64 8
92,664	92,664	92,664

2. Box C. Explain how the red numbers are placed. Read the rule on page 95.

3. To check, we reverse factors and multiply again (box D).

[W]

Find the products for Ex. 4a and 4b the long way. Do the others the short way. Check all your work.

	a	b	c	d	e	f	g
4.	837	659	418	932	486	576	849
	×153	×425	×376	×689	×237	×798	×424

Extra Practice. Work Set 50.

Watch Zeros in Three-Place Multipliers!

[O]

1. Copy Ex. a to d on the board without the work and then multiply. To check, compare your work with that in the book.

a. $$\begin{array}{r} 583 \\ \times 240 \\ \hline 23\ 320 \\ 116\ 6 \\ \hline 139{,}920 \end{array}$$

b. $$\begin{array}{r} 749 \\ \times 608 \\ \hline 5\ 992 \\ 449\ 40 \\ \hline 455{,}392 \end{array}$$

c. $$\begin{array}{r} 853 \\ \times 409 \\ \hline 7\ 677 \\ 341\ 2 \\ \hline 348{,}877 \end{array}$$

d. $$\begin{array}{r} 800 \\ \times 700 \\ \hline 560{,}000 \end{array}$$

2. In Ex. a, the first partial product is _?_. We write "0" in _?_ place. What is the ten's partial product? How do we write the third partial product?

3. In Ex. b, the second, or ten's, partial product is zero. Why? In which place is this zero written? What does the third partial product mean?

4. In Ex. c, what is the ten's partial product? Why do we not need to write this product zero if we write the hundred's partial product correctly?

5. In Ex. d, explain all the product zeros.

[W]

Copy and finish the examples in row 6.

6. a $$\begin{array}{r} 478 \\ \times 302 \\ \hline 956 \\ 40 \\ \hline \end{array}$$

b $$\begin{array}{r} \$7.89 \\ \times 218 \\ \hline 6312 \\ 789 \\ \hline \end{array}$$

c $$\begin{array}{r} 750 \\ \times 605 \\ \hline 50 \\ 000 \\ \hline \end{array}$$

d $$\begin{array}{r} 749 \\ \times 806 \\ \hline 94 \\ 920 \\ \hline \end{array}$$

e $$\begin{array}{r} 780 \\ \times 403 \\ \hline 40 \\ 00 \\ \hline \end{array}$$

Find products for these:

7. a $$\begin{array}{r} 349 \\ \times 400 \\ \hline \end{array}$$

b $$\begin{array}{r} 785 \\ \times 470 \\ \hline \end{array}$$

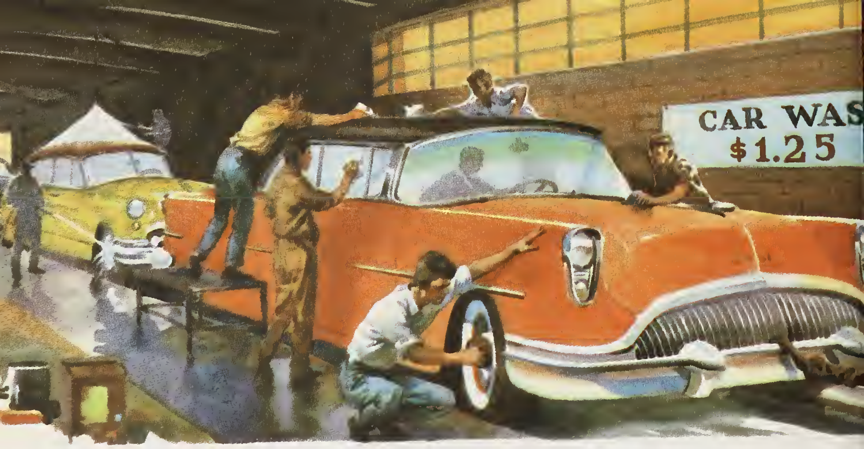
c $$\begin{array}{r} 698 \\ \times 402 \\ \hline \end{array}$$

d $$\begin{array}{r} 578 \\ \times 300 \\ \hline \end{array}$$

e $$\begin{array}{r} 396 \\ \times 650 \\ \hline \end{array}$$

f $$\begin{array}{r} 745 \\ \times 203 \\ \hline \end{array}$$

Extra Practice. Work Set 52.



At the Auto-Wash

Using data from previous problem [W]

1. Steve's father had his car washed 24 times last year at the Auto-Wash in the picture. What did this cost him?

2. The men wash an average of 76 cars a day. What amount do they take in per day on the average?

3. The Auto-Wash was open for business 310 days last year. About how many cars did they wash in that time?

4. How many days was the Auto-Wash closed last year? (Use 365 days for a year.)

5. The Auto-Wash in the picture opens at 8:30 A.M. and closes at 5:30 P.M. How many hours is it open?

Practice in Multiplying

Cumulative review of multiplication [W]

Multiply. Check by multiplying a second time.

	a	**b**	**c**	**d**	**e**	**f**	**g**
1.	894 ×9	78 ×56	529 ×74	893 ×267	$0.96 ×38	$7.80 ×49	$8.59 ×208
2.	508 ×7	98 ×70	746 ×58	694 ×753	$0.56 ×75	$9.34 ×86	$7.04 ×986

A Matching Game with Estimates

A., S., M., D. [O]

1. Bob's estimate for one example in row 5 is $8. Which example does his estimate match? See if you know, but do not tell the answer yet.

2. Jim said, "It couldn't be Ex. a." Why did Jim say that?

3. "It isn't Ex. b," said Ann. "That answer is about _?_."

4. "Bob's estimate is for Ex. c," said Fred. Do you agree?

Match each estimate below with an example in row 5.

Estimates: $35 $60 900 7,000 $30

	a	b	c	d	e	f
5.	4,867	$90.25		$41.15	$6.97	
	+2,187	−28.97	7)$55.72	−9.89	×5	4)3,704

Turn to page 143, row 3. Estimate an answer. See who can be the first to tell which example your estimate matches.

How Well Can You Follow Directions?

[W]

1. Multiply $0.69 by 8.
2. Subtract $1.56 from $8.21.
3. Divide 1,672 by 8.
4. Add $48.96 to $9.57.
5. Divide $85.00 by 9.
6. Take $44.18 from $50.30.
7. Find the sum of $\frac{5}{8}$, $\frac{7}{8}$, and $\frac{3}{8}$.
8. Subtract $\frac{5}{6}$ from $2\frac{1}{6}$.
9. 80 times 76 = ?
10. To $73.68 add $546.
11. Divide 667 by 73.
12. $30.56 less $8.79 = ?
13. Multiply 247 by 56.
14. $90 minus $32.41 = ?
15. Add $3\frac{1}{5}$, $2\frac{4}{5}$, and 6.
16. From $9\frac{1}{4}$ take $6\frac{3}{4}$.

Write four word-problems using the numbers in Ex. 1 to 4. A word-problem for Ex. 1 might be:

Find the cost of 8 lb. of meat at 69¢ a pound.

Work for Young Experimenters

Enrichment activity [O]

1. Can you explain the way these young experimenters worked? Did they get correct products? Show that they did.

2. Which part of the multiplier did Jack use first?

3. How is Betty's way different from Jack's way?

4. Did Jack and Betty show a partial product for each figure in the multiplier?

Jack's way	**Betty's way**
374	374
×268	×268
74 800	74 8
22 440	22 44
2 992	2 992
100,232	100,232

[W]

Use Jack's way or Betty's way to find these products:

5. 876 × 342	7. 905 × 756	9. 796 × 385
6. 594 × 739	8. 427 × 398	10. 482 × 729

Making Comparisons

[W]

Which is more and how much more?

	a	b
1.	50 da. or 7 wk.	9 × 725 or 6,400
2.	5 lb. or 64 oz.	8 × $34.79 or $280
3.	3 hr. or 200 min.	42 × $8.56 or $375
4.	150 yd. or 500 ft.	30 × $9.75 or $290
5.	3 mi. or 16,000 ft.	83 × 702 or 59,000
6.	5 yd. or 200 in.	67 × 374 or 25,000

7. Multiply the difference between

a. 680 and 264 by the sum of 95 and 28.

b. 4,085 and 3,567 by the sum of 49 and 86.

c. 2,150 and 1,936 by the sum of 246 and 79.

d. 3,000 and 2,879 by the sum of 189 and 264.

Buying and Using Garden Supplies

Problem-solving; missing numbers [O]

To solve each problem below, you need more facts than are given. Tell what is missing in each problem and supply reasonable numbers.

1. Jim bought 6 packages of flower seeds and 5 packages of vegetable seeds. What was the total cost of his seeds?

2. Tom's father bought 1 dozen rose bushes. What was the average cost of a bush?

3. Mrs. Day bought a bird bath for $3.75 and ½ dozen geranium plants. How much change did she receive from $20?

4. Mr. Adams saved 95¢ on an apple tree and $1.19 on a peach tree by buying them at a sale. How much would each of the two trees have cost before the sale?

5. The new hose Mr. Gates bought is twice as long as his old hose. How many feet of hose will there be in one piece when the new hose and the old hose are attached?

6. Mary's father used 2 large bags of fertilizer on his front lawn and 3 small bags on his back lawn. How many pounds of fertilizer did he use on both lawns?

7. Mr. Sand bought a new power lawn mower for $127.50 and paid for it in equal payments. What amount did he have to pay each time?

[W]

Now solve the problems.

From Easy to Difficult Division Practice

[W]

On your paper, write the quotients for row 1 without copying the examples.

	a	b	c	d	e	f
1.	3)96	8)560	9)459	6)$54.30	7)3,542	8)$40.00

Copy and divide the following:

2.	4)72	5)97	8)392	7)$5.32	9)650	96)$480
3.	7)973	4)953	6)3,570	8)$42.08	7)4,005	74)$370
4.	4)9,375	5)8,539	7)9,315	6)$87.90	4)7,786	43)265
5.	7)38,867	4)18,362	6)50,898	9)$812.70	8)56,325	65)329

Which Estimate Is Closest?

[W]

From the three numbers given after each example, choose and write the one you think is nearest the exact answer. Use what you have learned about rounded numbers to help you.

1.	3 × 798	2,100	2,400	2,500
2.	6,024 − 1,996	4,000	3,000	5,000
3.	784 + 978 + 735	2,300	2,600	2,500
4.	1,596 ÷ 4	400	300	500
5.	5 × $8.75	$40.00	$45.00	$50.00
6.	$17.15 − $9.96	$9.00	$8.00	$7.00
7.	$4.87 + $6.15 + $7.98	$17.00	$19.00	$20.00
8.	$47.92 ÷ 8	$6.00	$5.00	$9.00
9.	4 × $6.89	$24.00	$28.00	$40.00

Now find the exact answers for the above examples and see how close your estimated answers were.

Do You Understand?

Test of Information and Meaning 4

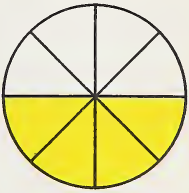
A	B	C	D
$\begin{array}{r} 9 \\ 50\overline{)470} \\ \underline{450} \\ 20 \end{array}$	$\begin{array}{r} 8 \\ 70\overline{)560} \end{array}$	$90\overline{)360}$	$\begin{array}{r} 3 \\ 42\overline{)175} \\ \underline{126} \\ 49 \end{array}$

1. In Ex. A, how many 50's are subtracted all at once?

2. Write the helping division fact for Ex. B.

3. In Ex. C, we can think, "There are as many 90's in 360 as there are _?_ in _?_."

4. We know that the quotient for Ex. D is not correct because the _?_ is larger than the divisor.



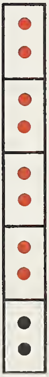
5. Write three equal fractions that show the part of the circle which is yellow.

6. Fifteen feet equal _?_ yards.

7. One pound 4 ounces equal _?_ ounces.

8. Write $3\frac{4}{4}$ in better form for an answer.

9. At 84¢ a pound, which costs more, $1\frac{3}{8}$ lb. of steak or $1\frac{3}{4}$ lb. of steak?



10. Copy and write the missing numbers:

a. $3\frac{1}{4} = 2\frac{?}{4}$; **b.** $1\frac{3}{8} = \frac{?}{8}$; **c.** $2\frac{3}{5} = 1\frac{?}{5}$.

11. Copy the number which is the best estimate for the product of 6 × \$4.98. \$24 \$30 \$36

12. Write the products for:

a. 10 × 475; **b.** 100 × 708; **c.** 10 × 150.

13. What part of all the dots in the picture is red?

14. The product of 12 × 135 will be how many times the product of 4 × 135?

Do You Make Mistakes?

Diagnostic Test 4

Copy and work. You need not check your answers.

	a	b	c	Study Pages	Practice Sets
1.	$90\overline{)540}$	$70\overline{)580}$	$40\overline{)390}$	131–136	40
2.	$42\overline{)88}$	$93\overline{)279}$	$71\overline{)429}$	138–140	
3.	$81\overline{)692}$	$95\overline{)387}$	$63\overline{)200}$	141–142	41–44
4.	200×725	345×679	$734 \times \$6.58$	158–160	50
5.	704×369	$690 \times \$7.08$	803×940	161	52
6.	$9\frac{2}{5} + 4\frac{1}{5}$	$10\frac{5}{6} - 3\frac{5}{6}$	$6\frac{7}{8} - 4\frac{3}{8}$	146–147	45
7.	$5\frac{7}{10} + 8\frac{3}{10}$	$6\frac{3}{8} + 9\frac{7}{8}$	$\frac{9}{16} + 4\frac{7}{16}$	148	46
8.	$6 - 2\frac{7}{12}$	$8\frac{1}{4} - \frac{3}{4}$	$4\frac{3}{16} - 1\frac{9}{16}$	152–155	48

Can You Solve Problems?

Problem Test 4

Think carefully as you read and work Ex. 1 to 10.

1. The Thanksgiving play at the Lake School will be given in the assembly hall. The hall has 24 rows of seats with 18 seats in a row. How many seats are there in all?

2. Miss Hill bought $10\frac{3}{4}$ yd. of material to make Pilgrim costumes and $7\frac{3}{4}$ yd. to make Indian costumes. How many yards of material did she buy?

3. How many more yards did the Pilgrim costumes take than the Indian costumes? (See Ex. 2.)

4. Material to make Pilgrim hats cost \$1.87. How much change did Miss Hill receive from \$5.00?

5. Mary bought $\frac{1}{4}$ yd. of beaded ribbon at 80¢ a yard. How much did it cost?

6. The 32 pupils in Grade 5 painted turkeys on 160 programs. This was an average of how many programs per pupil?

7. It took Mary about 10 min. to paint one program. At this rate, how many programs could she paint in an hour?

8. The school sold 145 tickets for adults and 280 tickets for children. This was how many tickets in all?

9. How many fewer adults' tickets than children's were sold?

10. Tickets for adults sold for 25¢ and children's tickets for 15¢. How much did the school take in from the sale of both kinds of tickets?

How Well Can You Figure?

Computation Test 4

Copy and work. You need not check your answers.

1. $\begin{array}{r} \$14.38 \\ \underline{\times 7} \end{array}$ **2.** $.9\overline{)\$84.35}$ **3.** $\begin{array}{r} \$82.10 \\ \underline{-9.54} \end{array}$ **4.** $\begin{array}{r} 46 \\ \underline{\times 79} \end{array}$ **5.** $70\overline{)367}$

6. $\begin{array}{r} 906 \\ \underline{\times 84} \end{array}$ **7.** $82\overline{)278}$ **8.** $\begin{array}{r} \$130.02 \\ \underline{-96.78} \end{array}$ **9.** $\begin{array}{r} \$3.67 \\ \underline{\times 59} \end{array}$ **10.** $65\overline{)470}$

11. Subtract $6\frac{9}{10}$ from $8\frac{3}{10}$.

12. Divide 651 by 93.

13. Multiply 947 by 800.

14. Find $\frac{1}{8}$ of $394.88.

15. Add: $2\frac{3}{10} + 1\frac{7}{10} + 5\frac{9}{10}$.

16. Find $\frac{1}{6}$ of 1,518.

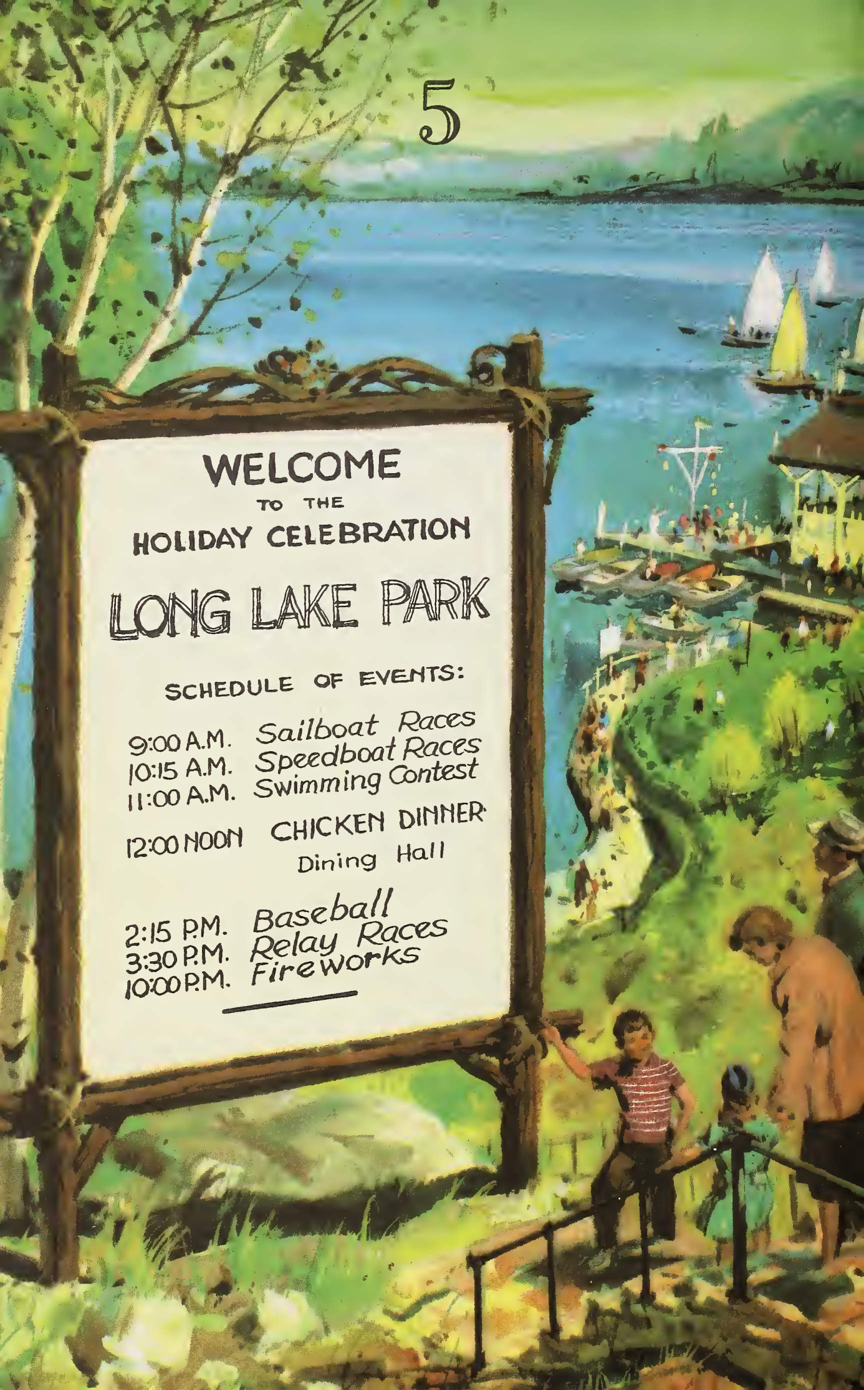
17. $15\frac{1}{12}$ less $4\frac{7}{12} = ?$

18. Divide 590 by 84.

19. Multiply 960 by 307.

20. Add $4\frac{3}{8}$, $6\frac{7}{8}$, and $2\frac{5}{8}$.

5


WELCOME
TO THE
HOLIDAY CELEBRATION
LONG LAKE PARK
SCHEDULE OF EVENTS:
9:00 A.M. Sailboat Races
10:15 A.M. Speedboat Races
11:00 A.M. Swimming Contest
12:00 NOON CHICKEN DINNER
Dining Hall
2:15 P.M. Baseball
3:30 P.M. Relay Races
10:00 P.M. Fireworks

A Holiday at the Park

Time schedule [O]

1. Henry and Ellen are happy. They are to spend the holiday at Long Lake Park. What events are scheduled for the day? At what time is each event to take place?

2. Which events take place in the morning? in the afternoon? in the evening? How can you tell?

3. On an old alarm clock or a toy clock, show the time for each event at the park.

Use a clock to help you answer questions 4 to 7.

4. If Henry and his family arrived at half past eight, how long did they have to wait before the sailboat races began?

5. How long is it from the time the sailboat races begin until the speedboat races begin?

6. Use a and b below to help you tell how long it is from each of the other morning events to the next.

a. From 10:15 A.M. to 11:00 A.M. is _?_ min.
b. From 11:00 A.M. to 12:00 noon is _?_ hr.

7. Now for the rest of the schedule, tell how long it is from each event to the next.

8. In one of the relay races, Henry ran 45 yd. in 9 seconds. Tell how many yards per second he averaged. How many feet per second did he average?

[W]

9. Make a schedule for your school-day morning showing the time you get up; eat breakfast; leave for school; arrive in school; leave school for lunch; and so on.

10. Make a schedule showing the time each of your classes at school starts during a day.

11. Turn to page 327 and make a list of the units for measuring time. Study the table until you know all the facts in it.

A

B

Seconds, Minutes, Hours

Meaning [O]

1. On your schoolroom clock or on clock A above, prove that there are 60 minutes in an hour. Is this easy if you count the minute marks by 5's?

2. From 9 o'clock in the morning to 11 o'clock in the same morning is how many hours? how many minutes?

3. One day last summer Jim rode on a train from 8 A.M. to 8 P.M. How many hours was he on the train? Count the hours on a clock.

4. a. From 10 A.M. Monday to 10 P.M. Monday = _?_ hr.
b. From 10 P.M. Monday to 10 A.M. Tuesday = _?_ hr.
c. From 10 A.M. Monday to 10 A.M. Tuesday = _?_ hr.

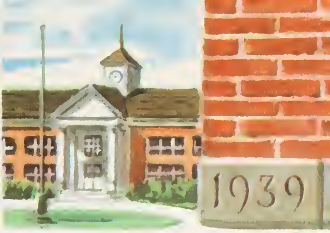
From a given time today to the same time tomorrow is 24 hours, or 1 day.

5. Picture B above shows Dr. Sand's watch. Can you find the second hand on it? It takes the second hand 60 seconds, or 1 minute, to move around the dial. Why does a doctor need a watch with a second hand?

6. Count the number of times you can tap your finger in a minute; in a second.

7. How many steps can you take in 1 minute? in 1 second?

8. Turn to the top of page 19. How many answers can you give in 1 minute?



Weeks, Months, Years

[W]

1. The picture shows the cornerstone on Fred's school. How old is his school now?

2. The church near Fred's home was built in 1897; the library was built in 1905; and the hospital in 1926. How many years ago was each one built?

3. Alice was born in 1942. Betty, who celebrates her birthday on the same day, was born in 1937. How old is each girl now? How much older is Betty than Alice?

4. One year equals how many months? weeks? days?

5. Every fourth year is a leap year. The years 1952, 1948, 1944, and 1940 were leap years. Divide each of these dates by 4. Are there any remainders? There should not be any.

6. List the next four leap years after 1952.

7. From Sept. 1 to Dec. 1 is how many months?

8. Bill worked at one job for 3 weeks. He started work on June 18. On what date did he finish?

9. Peggy started a two-week vacation on July 20. On what date did her vacation end?

10. Sam's birthday is December 8. How many days is it from Sam's birthday until Christmas?

11. Mary was 11 yr. old on June 5. In the same year, Ruth was 11 on October 5. Mary is _?_ months older than Ruth.

12. Ruth and her family have lived in the same house for exactly 3 years. How many months is that? How many weeks?

13. 3 wk. = _?_ da.

14. 4 da. = _?_ hr.

15. 2 hr. = _?_ min.

16. 35 da. = _?_ wk.

17. 180 min. = _?_ hr.

18. 36 mo. = _?_ yr.

How Many Are a Million?

Meaning [O]

Bob's home is on a busy street. Bob's father told him that nearly 1,000 cars pass their house every day.

"Then about a million cars pass here in a month," said Bob.

"Indeed not," said his father. "A million is a much larger number than that. It would take all the cars that go by while you are in grades 5, 6, and 7 to make a million cars. A thousand cars a day for 1,000 days—that would be a million cars."

One million is written **1,000,000.** We use _?_ zeros.

The man at the bank counts very fast, but he would need about 19 working days to count $1,000,000 in $1 bills.

If he counts $10 bills, he will reach 1 million dollars in about two days. He will need to count 100,000 of these $10 bills.

To count out 1 million dollars with $100 bills would take 10,000 bills.

If the bank man counts $1,000 bills, he will count only 1,000 bills and it would probably take less than 10 minutes.

1 million (1,000,000) is
- 10 times 100,000
- or
- 100 times 10,000
- or
- 1,000 times 1,000

1. If you count by 1's, what number comes next after 9,999? after 99,999? after 999,999?

2. Read these facts about the millions of things that were made and used in North America in a recent year.

a. 15,000,000 (15 million) radio sets were made.

b. 53,000,000 homes had radio sets.

c. 29,000,000 homes had television sets.

d. 64,000,000 automobiles, trucks, and buses were registered.

Reading and Writing Large Numbers

Using periods [O]

1. The numbers in Ex. 2 on page 174 were rounded to the nearest million. The numbers below are not rounded. Try to read them.

6,240,542 → 6 million 240 thousand 542
80,652,956 → 80 million 652 thousand 956
475,289,316 → 475 million 289 thousand 316

2. Can you read this number: 834697150? This number is easier to read when it is **marked off into periods** (groups of 3 figures each, beginning at the right) like this: 834,697,150.

Read these numbers:

	a	b	c	d
3.	564,289	19,000,742	68,073,807	129,000,740
4.	8,704,200	30,670,005	5,086,705	230,486,059

[W]

5. Copy these numbers and mark them off into periods:

a. 675406 **b.** 70249530 **c.** 97000534 **d.** 204750930

Write these numbers on your paper using figures:

6. Ninety thousand six hundred fifty-nine.

7. Two hundred thousand seven hundred forty.

8. Three million eight hundred fifty thousand ten.

9. Twelve million sixty thousand four hundred.

To Keep in Practice

M. and D. practice [W]

	a	b	c	d
1. Multiply by 307:	480	900	609	$7.45
2. Divide by 64:	576	359	532	200
3. Multiply by 78:	6,904	5,006	3,025	$15.98
4. Find $\frac{1}{8}$ of	784	2,768	$56.72	$15.84

Planting Tulip Bulbs

[O]

1. Frank had 216 tulip bulbs to plant in 8 equal groups around the house. How many bulbs could he plant in each group?

Can Frank put 1 hundred bulbs in each of 8 groups? No, he would need 8 hundreds. He has only _?_ hundreds so there will not be a hundred's figure in the quotient.

But the 21 tens in 216 can be divided by 8, so the first partial dividend is _?_ tens. The quotient will have a ten's figure and a one's figure. We can show this with small x's, as in box A.

A

Locate the quotient figures with small x's:

$$8\overline{)2\overset{\times}{1}\overset{\times}{6}}$$

B

Divide tens:

$$\begin{array}{rl}
2 & \dashleftarrow 2 \text{ tens, or } 20 \\
8\overline{)2\overset{\times}{1}\overset{\times}{6}} & \\
\underline{16} & (2 \text{ tens} \times 8) \\
5 &
\end{array}$$

C

Divide ones:

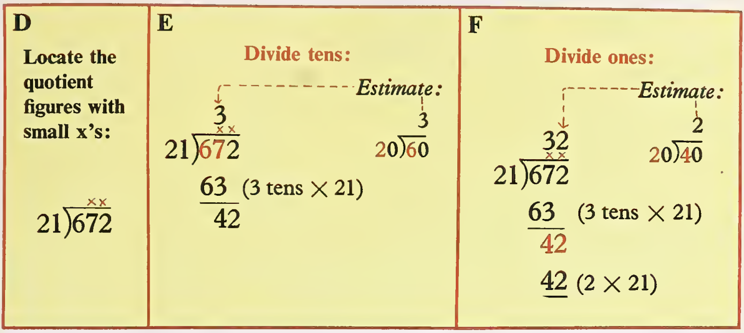
$$\begin{array}{rl}
27 & \\
8\overline{)2\overset{\times}{1}\overset{\times}{6}} & \\
\underline{16}\downarrow & (2 \text{ tens} \times 8) \\
56 & \\
\underline{56} & (7 \times 8)
\end{array}$$

Explain the division in boxes B and C. Why do we use the division steps twice?

216 ÷ 8 = ? Frank could put _?_ bulbs in each group.

2. The gardener at the park has 672 bulbs to plant in 21 equal groups. How many bulbs can he plant in each group?

Try to divide 672 by 21 before studying boxes D to F.



Box D. Why is there no x in hundred's place?

672 = 67 tens and 2 ones. Are 67 tens enough so the gardener can put at least 1 ten (10 bulbs) in each of 21 groups? Yes, so the first quotient figure will be in _?_ place.

First Partial Dividend (Box E)

Divide tens. What do we think to estimate the ten's quotient figure? 60 ÷ 20 = ? In which place is the quotient figure 3 written?

Multiply and compare. 3 (tens) × 21 = ? Can 63 (tens) be subtracted from 67 (tens)?

Subtract and compare. 67 − 63 = ? Why do we compare the remainder figure, 4, with the divisor, 21?

Bring down the 2 (ones) to make 42 ones. Then the second partial dividend is 42 ones.

Second Partial Dividend (Box F)

Explain the steps for dividing 42 ones by 21.

[W]

3. 882 bulbs are enough to make _?_ groups of 21 each.

4. 672 bulbs are enough to make _?_ groups of 42 each.

5. 704 bulbs are enough to make _?_ groups of 32 each.

Finding Two-Place Quotients

Remainder; check [O]

Always decide first how many quotient figures there will be. Then you can use small x's to show where they will be written.

Explain the work in the box at the right.

Say the first and the second partial dividends for each example in row 1.

Tell which examples in this row should have remainders:

$$\begin{array}{r}
12\text{, R5}\\
\text{x x}\\
32\overline{)389} \leftarrow\\
\underline{32}\ (1\text{ ten} \times 32)\\
69\\
\underline{64}\ (2 \times 32)\\
5
\end{array}
\qquad
\begin{array}{r}
\text{Check}\\
32\\
\underline{\times\ 12}\\
64\\
\underline{32}\\
384\\
\underline{+\ 5}\\
\rightarrow 389
\end{array}$$

	a	b	c	d	e	f
	32	31	21	31	22	21
	x x	x x	x x	x x	x x	x x
1.	$21\overline{)678}$	$32\overline{)992}$	$42\overline{)895}$	$22\overline{)694}$	$40\overline{)896}$	$23\overline{)483}$
	$\underline{63}$	$\underline{96}$	$\underline{84}$	$\underline{66}$	$\underline{80}$	$\underline{46}$
	48	32	55	34	96	23
	$\underline{42}$	$\underline{32}$	$\underline{42}$	$\underline{22}$	$\underline{80}$	$\underline{23}$

[W]

Copy, divide, and check, as in the box.

2. $31\overline{)698}$ $21\overline{)899}$ $42\overline{)462}$ $23\overline{)498}$ $41\overline{)887}$ $31\overline{)651}$

3. $11\overline{)269}$ $30\overline{)396}$ $32\overline{)678}$ $43\overline{)489}$ $22\overline{)682}$ $33\overline{)697}$

4. $34\overline{)394}$ $21\overline{)299}$ $31\overline{)347}$ $11\overline{)495}$ $14\overline{)294}$ $41\overline{)861}$

Making Division Problems

Supplying questions [W]

Write questions to make division problems of the following. Then do the work to answer the questions.

1. Fred put 288 books on shelves with 24 books on each shelf.
2. Mary's father planted 275 bulbs in groups of 25 each.
3. A teacher divided 150 blotters equally among 30 children.

Estimating the Whole Quotient

2-place quotient [O]

1. If 6 children share equally in making 42 badges for their club, how many badges must each child make? $\frac{1}{6}$ of 42 = ?

2. How many badges must 23 children average in making 483 badges for the children in their school?

To find how many in one of the 23 equal parts of 483, we divide _?_ by _?_. What is the ten's figure of the quotient?

$$\boxed{\begin{array}{r} 2 \\ 23\overline{)483} \end{array}}$$

In the box, the quotient figure, 2, in ten's place means 20, so we can estimate that the whole quotient will be a number between 20 and 30.

On the board find the exact quotient.

In rows 3 to 5, estimate each whole quotient. In Ex. 3a say, "The first quotient figure is 4 written in ten's place, so the whole quotient is a number between 40 and 50."

[W]

Now find the exact quotients in rows 3 to 5.

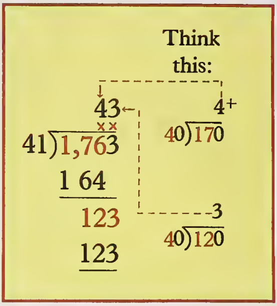
	a	b	c	d	e	f
3.	$24\overline{)987}$	$23\overline{)978}$	$21\overline{)714}$	$44\overline{)532}$	$54\overline{)602}$	$45\overline{)945}$
4.	$25\overline{)579}$	$46\overline{)969}$	$36\overline{)799}$	$24\overline{)778}$	$37\overline{)790}$	$43\overline{)930}$
5.	$26\overline{)576}$	$24\overline{)528}$	$37\overline{)824}$	$28\overline{)590}$	$47\overline{)999}$	$27\overline{)594}$

➤ **Extra Practice.** Work Sets 53 and 54.

Four-Place Dividends

2-place quotients [O]

1. Forty-one boys sold 1,763 candy bars at a concert. What was the average number per boy?



The dividend (1,763) has how many hundreds in all? Are 17 hundreds enough for each of the 41 boys to sell 1 hundred?

Are there enough tens so each boy can sell some number of tens? Yes, so 176 (tens) is the first partial dividend.

First Partial Dividend (getting tens)

Divide tens: 176 ÷ 41, or about 170 ÷ 40 = ? When 4 is written (in the box) as the ten's quotient figure, does this mean that each boy might sell between 40 and 50 candy bars? Why?

Multiply and compare. 4 (tens) × 41 = 164 (tens). Can 164 (tens) be subtracted from 176 (tens)?

Subtract and compare. 176 − 164 = 12. Is the remainder number, 12, smaller than the divisor number, 41?

Bring down 3 ones. 12 tens and 3 ones = _?_ ones.

Second Partial Dividend (getting ones)

Tell what steps to use in finding the one's quotient figure.

Say the first partial dividend and tell what to think to find the first quotient figure in each example in rows 2 and 3.

[W]

Copy, divide, and check each example.

	a	b	c	d	e
2.	41)2,665	61)3,172	43)908	71)1,633	80)3,867
3.	32)675	72)1,656	51)2,295	82)1,968	90)7,586

Extra Practice. Work Set 55.

Placing Quotient Figures

Long way and short way [O]

The long way and the short way to think in placing the first quotient figure for the example in the box are given below. The long way shows what the short way means.

$$31\overline{)2{,}6\overset{\times}{9}\overset{\times}{7}}$$

Long way: In 2,697, the 2 thousands are not enough to put even 1 thousand in each of 31 groups, because 31 × 1 thousand = 31 thousands. There will not be a thousand's figure in the quotient.

26 hundreds are not enough to put even 1 hundred in each of 31 groups because 31 × 1 hundred = 31 hundreds. There will not be a hundred's figure in the quotient.

269 tens are enough to put some number of tens in each of 31 groups. The first figure in the quotient will be in ten's place. Of course, this means there will also be a figure in one's place.

Short way: Can 2 (thousands) be divided by 31? No.

Can 26 (hundreds) be divided by 31? No.

Can 269 (tens) be divided by 31? Yes, so there will be a ten's figure and a one's figure in the quotient.

Tell why each example in rows 1 and 2 will have as many quotient figures as shown by the x's. Tell also why the quotient figures will be placed where you see the x's. Use the long way for row 1 and the short way for row 2.

	a	b	c	d	e	f
1.	$6\overline{)4\overset{\times}{9}}$	$6\overline{)\overset{\times}{9}\overset{\times}{5}}$	$6\overline{)5\overset{\times}{0}\overset{\times}{8}}$	$6\overline{)\overset{\times}{8}\overset{\times}{7}\overset{\times}{5}}$	$6\overline{)2{,}\overset{\times}{7}\overset{\times}{3}\overset{\times}{6}}$	$6\overline{)\overset{\times}{9}{,}\overset{\times}{4}\overset{\times}{6}\overset{\times}{2}}$
2.	$62\overline{)9\overset{\times}{7}}$	$62\overline{)31\overset{\times}{0}}$	$62\overline{)7\overset{\times}{4}\overset{\times}{4}}$	$62\overline{)1{,}9\overset{\times}{8}\overset{\times}{4}}$	$51\overline{)\overset{\times}{9}\overset{\times}{9}6}$	$51\overline{)1{,}7\overset{\times}{8}\overset{\times}{9}}$

[W]

Copy, divide, and check the examples in rows 1, 2, and 3.

3.	$90\overline{)6{,}789}$	$51\overline{)1{,}836}$	$82\overline{)984}$	$81\overline{)2{,}754}$	$42\overline{)966}$	$71\overline{)2{,}272}$

Easy Examples With Four-Place Dividends

[O]

Explain the work in row 1 and tell how to finish each example.

	a	b	c	d	e
1.	32 × × 62)1,984 1 86 124	22 × × 81)1,795 1 62 175	65 × × 61)3,995 3 66 335	34 × × 52)1,799 1 56 239	66 × × 21)1,397 1 26 137

[W]

Copy and finish the examples in row 1. Check each one.

Copy, divide, and check the examples in rows 2 to 4. Let the x's help you in row 2.

2.	× × 41)1,859	× × 82)1,886	× × 61)2,989	× × 42)1,398	× × 22)687
3.	72)1,688	51)4,896	81)7,695	71)3,997	32)998
4.	70)6,893	73)1,699	21)1,155	82)1,989	23)497

5. George's father used 20 gal. of gasoline in going 280 mi. How many miles did his car average on a gallon of gasoline?

6. If your father's car averages 21 mi. per gallon of gasoline, how many gallons will he use in going 483 mi.?

7. Louise's new book has 252 pages in it. If she reads an average of 21 pages an hour, how many hours will it take her to finish the book?

Can You Find n, the Missing Addend?

Practice in A. and S. [W]

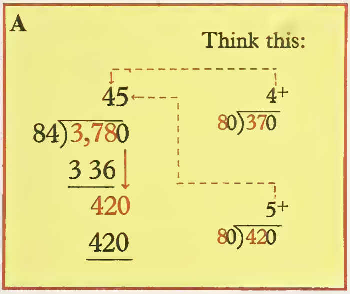
1. $678 + n = 9{,}000$
2. $n + 1{,}465 = 5{,}003$
3. $\$5.87 + n = \$9.50$
4. $n + \$13.49 = \$20.16$
5. $86 + 75 + 98 + 34 + n = 815$
6. $654 + n + 47 + 93 = 900$
7. $249 + 758 + n + 30 = 1{,}037$
8. $n + \$6.79 + \$4.36 + \$7.98 = \$27.50$

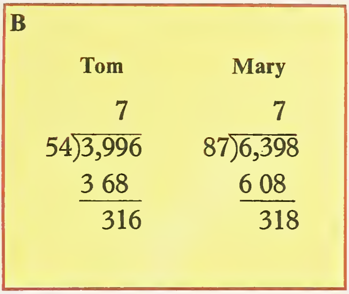
Watch Carrying in the Multiplication Step!

2-place divisors and 2-place quotients [O]

1. Explain all the work in box A.

2. Tom and Mary both made mistakes (box B). Find their mistakes and work each example correctly on the board.





In rows 3 to 5, estimate each whole quotient. For Ex. 3a say, "The first quotient figure is 4 written in ten's place, so the whole quotient is a number between 40 and 50."

	a	b	c	d	e
3.	$53\overline{)2{,}226}$	$84\overline{)5{,}379}$	$92\overline{)5{,}990}$	$64\overline{)3{,}349}$	$37\overline{)787}$
4.	$74\overline{)3{,}922}$	$32\overline{)2{,}368}$	$54\overline{)4{,}499}$	$85\overline{)4{,}597}$	$38\overline{)798}$
5.	$83\overline{)3{,}758}$	$63\overline{)5{,}292}$	$43\overline{)1{,}892}$	$82\overline{)7{,}796}$	$64\overline{)986}$

[W]

Now find the exact quotients in rows 3–5.

➤ **Extra Practice.** Work Set 56.

What Is Each Customer's Change?

[W]

Write an estimate before you find each exact answer.

Customer	Bought	Gave the clerk
1. Mrs. A.	3 lb. of chops at 78¢ a pound	$5.00
2. Mrs. B.	$\frac{1}{2}$ lb. cheese at 90¢ a pound	$1.00
3. Mrs. C.	5 cans of pears at 47¢ a can	$3.00

Watch Borrowing in the Subtraction Step!

What do we think to estimate the quotient figures for the example in the box?

Explain the borrowing in both subtraction steps.

For each example in rows 1 to 3, tell the first quotient figure and where it will be placed.

[O]

Think this:

$$\begin{array}{r} 32 \\ 63\overline{)2{,}035} \\ \underline{1\ 89} \\ 145 \\ \underline{126} \\ ?? \end{array} \qquad \begin{array}{r} 3+ \\ 60\overline{)200} \\ \\ 2+ \\ 60\overline{)140} \end{array}$$

[W]

Divide and check in rows 1 to 3. Try to think the borrowing so you will not have to cross out figures and write new ones.

	a	b	c	d	e
1.	$44\overline{)970}$	$82\overline{)2{,}706}$	$64\overline{)1{,}410}$	$81\overline{)7{,}963}$	$54\overline{)1{,}214}$
2.	$71\overline{)6{,}212}$	$32\overline{)1{,}024}$	$61\overline{)4{,}002}$	$72\overline{)1{,}728}$	$52\overline{)1{,}784}$
3.	$81\overline{)6{,}399}$	$92\overline{)1{,}196}$	$83\overline{)1{,}921}$	$33\overline{)1{,}089}$	$81\overline{)5{,}508}$

Extra Practice. Work Set 57.

Watch both the Carrying and the Borrowing

[W]

Copy row 1 without the answers. Close your book and divide. Then open your book and check your answers.

1.	$\begin{array}{r} 54 \\ 75\overline{)4{,}050} \end{array}$	$\begin{array}{r} 36, \text{R}17 \\ 84\overline{)3{,}041} \end{array}$	$\begin{array}{r} 17, \text{R}4 \\ 85\overline{)1{,}449} \end{array}$	$\begin{array}{r} 92, \text{R}45 \\ 63\overline{)5{,}841} \end{array}$

Copy, divide, and check in rows 2 to 4.

	a	b	c	d	e
2.	$54\overline{)4{,}914}$	$93\overline{)7{,}069}$	$65\overline{)2{,}814}$	$74\overline{)4{,}144}$	$68\overline{)1{,}020}$
3.	$45\overline{)2{,}357}$	$92\overline{)5{,}160}$	$53\overline{)3{,}445}$	$62\overline{)1{,}690}$	$86\overline{)1{,}040}$
4.	$94\overline{)8{,}742}$	$74\overline{)3{,}259}$	$63\overline{)3{,}482}$	$52\overline{)1{,}300}$	$92\overline{)3{,}159}$

Extra Practice. Work Set 58.

Sharing Costs

Dividing money numbers [O]

1. Jim said, "Let's buy a radio for our classroom. We can get a small one for $26.24 and we'll share the cost equally."

"That's a good idea," said Sue. "There are 32 of us in the room and each share would be less than a dollar."

Was Sue right? Why? If each child paid $1 how many dollars would there be?

What was each child's share of the cost? $26.24 ÷ 32 = ?

Explain the work in box A. Why does the quotient need a decimal point and dollar sign?

A

$$\begin{array}{r} \$0.82 \\ 32\overline{)\$26.24} \\ \underline{25\ 6} \\ 64 \\ \underline{64} \end{array}$$

Check

$$\begin{array}{r} \$0.82 \\ \underline{\times\ 32} \\ 1\ 64 \\ \underline{24\ 6} \\ \$26.24 \end{array}$$

2. Could 22 children equally share the cost of a $9.50 picture?

Explain the division in box B. If each child pays $0.43, how much will be paid? How many cents more are needed? How is the remainder used in the check?

Bob said, "Four of us will have to pay 44¢ each." Was he right? Why?

B

$$\begin{array}{r} \$0.43,\ \text{R}4¢ \\ 22\overline{)\$9.50} \\ \underline{8\ 8} \\ 70 \\ \underline{66} \\ 4 \end{array}$$

Check

$$\begin{array}{r} \$0.43 \\ \underline{\times\ 22} \\ 86 \\ \underline{8\ 6} \\ \$9.46 \\ \underline{+\ 0.04} \\ \$9.50 \end{array}$$

3. Should Ex. 4b have a decimal point in the quotient? Why?

[W]

Copy, divide, and check in rows 4 to 6.

	a	b	c	d	e
4.	$43\overline{)\$5.19}$	$38\overline{)\$798}$	$73\overline{)\$59.42}$	$84\overline{)\$46.20}$	$73\overline{)\$55.69}$
5.	$36\overline{)\$7.56}$	$27\overline{)\$567}$	$69\overline{)\$28.29}$	$72\overline{)\$45.61}$	$47\overline{)\$14.59}$
6.	$47\overline{)\$9.90}$	$23\overline{)\$966}$	$84\overline{)\$54.10}$	$93\overline{)\$88.35}$	$52\overline{)\$44.98}$

Extra Practice. Work Set 59.

Zero as a Quotient Figure

[O]

A	B	C	D	E
30	40, R2	40, R10	$0.08	$0.05
28)840	9)362	34)1,370	7)$0.56	35)$1.75
84	36	1 36	56	1 75
0	2	10		

1. In Ex. A, why is 0 the one's figure in the quotient?

2. In Ex. B, can 2 (ones) be divided by 9? What must we write in one's place in the quotient to show this?

3. In Ex. C, how do we show that 10 (ones), the second partial dividend, cannot be divided by 34?

4. What do we write as a quotient figure when a partial dividend cannot be divided by the divisor?

5. Would Ex. A to C check if the quotient zeros were omitted? Try it on the board.

6. What is the cost of 1 orange if 7 cost 56¢? Explain Ex. D.

7. What is the cost of 1 ruler if 35 cost $1.75? Explain Ex. E.

8. In Ex. D and E, why can we not omit the quotient zeros?

9. Mary's mother paid $16.80 for 21 yd. of curtain material. Did she pay $1 a yard? How much a yard did she pay?

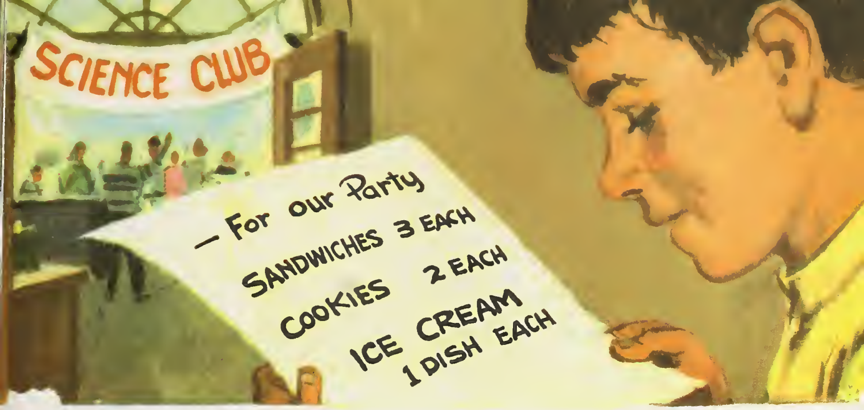
We write a quotient figure for each dividend figure we bring down. Sometimes the quotient figure is 0.

[W]

Copy, divide, and check in rows 10 to 12.

	a	b	c	d	e
10.	95)$85.50	87)5,255	96)4,899	84)6,727	57)$3.99
11.	68)$20.45	62)5,642	56)3,940	54)592	26)$7.89
12.	93)$6.51	43)3,459	62)5,879	98)689	95)$40.90

Extra Practice. Work Set 60.



The Science Club Party

Using data from other problems [W]

1. David's Science Club is planning a party for 80 children. What does David's list show that they plan to serve at the party?

2. How many sandwiches will be needed?

3. If one loaf of bread makes 20 sandwiches, how many loaves of bread should they buy?

4. At 21¢ a loaf, how much will the bread cost?

5. Betty bought 8 jars of sandwich spread at 47¢ a jar. What was her change from a $10 bill?

6. The committee estimated that one gallon of ice cream would serve 20 children. At $2.10 a gallon, what will ice cream cost for all the children at the party?

7. Jim bought 9 boxes of cookies with 18 cookies in each box. Will that be enough so that each of the children can have 2 cookies?

8. Jim paid $2.70 for the cookies. How much did a box cost, on the average?

9. Find the total cost of food for the party—the bread, sandwich spread, ice cream, and cookies.

Can You Choose the Correct Answer?

Review of relationships and meanings [O]

Which answer is correct? Prove it without pencil or paper.

1. What is your change from a $5 bill if you buy a $3.78 sweater? $2.22 $8.78 $1.22 $3.22

2. What is the product of 52 × 70? 4,036 3,064 3,640

3. How many hundreds in all in 50,972? 50 509 597

4. Which example helps you tell the product of 45 × 96?
69 × 45 = 3,105 96 × 50 = 4,800 4,320 ÷ 45 = 96

5. Which example has the product 100 times the product of 3 × 527? 30 × 527 300 × 527 100 × 527

6. How many inches are there in 5 yd.? 60 100 64 180

7. Which number means 7 million? 7,000 7,000,000 70,000

8. Which example do you work to find n in 32 × n = 384?
32 × 384 384 ÷ 32 384 − 32

Estimating Whole Quotients

Practice in D. [O]

1. Tom said, "For Ex. 3a, the quotient will be a number between 20 and 30." Was he right? How can you tell?

2. "The quotient for Ex. 3b will be a money number between 60¢ and 70¢," said Kate. Do you agree? Why?

In rows 3 to 5, estimate each whole quotient.

[W]

Copy, work, and check these examples:

	a	b	c	d	e
3.	$42\overline{)975}$	$84\overline{)\$52.08}$	$93\overline{)6,749}$	$47\overline{)987}$	$31\overline{)1,687}$
4.	$24\overline{)796}$	$51\overline{)\$43.86}$	$36\overline{)864}$	$72\overline{)4,720}$	$74\overline{)5,434}$
5.	$63\overline{)5,945}$	$35\overline{)\$8.75}$	$94\overline{)8,087}$	$83\overline{)6,943}$	$22\overline{)968}$

Extra Practice. Work Set 61.

Quick Thinking with Round Numbers

Mental computation, A., S., M., D. [O]

Do the work for rows 1 to 7 in your head. Say the answers.

	a	b	c	d
1.	3 × 80	\$4.80 ÷ 6	20 × 30	20 times 60
2.	350 ÷ 7	7 × \$0.40	360 ÷ 40	90 plus 250
3.	80 + 90	\$1.90 – \$0.70	140 + 160	70 from 390
4.	5 × 40	\$1.60 + \$1.20	370 – 210	Divide 280 by 90
5.	630 ÷ 9	\$2.00 – \$1.80	540 ÷ 60	250 minus 60
6.	540 – 230	\$4.90 ÷ 7	280 – 190	90 times 70
7.	$\frac{1}{8}$ of 400	$\frac{1}{4}$ of \$3.20	640 ÷ 80	Divide 580 by 70

How Well Can You Follow Directions?

Cumulative review, A., S., M., D. [W]

Copy and work. Check each answer.

1. Subtract \$8.89 from \$10.50.
2. Multiply \$2.89 by 5.
3. Divide 1,656 by 8.
4. \$37.15 plus \$296.75 = ?
5. Take 496 from 10,003.
6. Multiply 98 by 26.
7. Find $\frac{1}{7}$ of 3,472.
8. \$201.15 minus \$8.79 = ?
9. Find $\frac{1}{9}$ of \$34.20.
10. Add $7\frac{3}{8}$ to $4\frac{5}{8}$.
11. Divide 3,975 by 80.
12. Multiply \$7.80 by 94.
13. Add $16\frac{3}{4}$ to $25\frac{3}{4}$.
14. Divide 2,116 by 92.
15. Subtract $15\frac{3}{8}$ from 70.
16. 400 times \$6.75 = ?
17. Take $9\frac{5}{6}$ from $12\frac{1}{6}$.
18. Divide 6,699 by 72.
19. Multiply 456 by 342.
20. Divide \$26.64 by 74.

21–23. Write word problems using the numbers in Ex. 1 to 3 above. Make a problem for Ex. 1 about buying a coat at a sale; for Ex. 2 about buying material for a dress; for Ex. 3 about the average speed of an airplane.

To Bring You Up to Date!

Readiness for work with unlike-fractions [O]

a	b	c	d	e	f	g	h
$2\frac{3}{4}$	$\frac{9}{8}$	$\frac{5}{6}$	$\frac{10}{10}$	$1\frac{3}{5}$	$\frac{6}{5}$	$\frac{5}{8}$	$\frac{17}{10}$
$\frac{8}{5}$	$\frac{3}{4}$	$\frac{11}{12}$	$1\frac{3}{10}$	$\frac{12}{6}$	$\frac{9}{10}$	$\frac{5}{2}$	$\frac{1}{35}$

1. In separate columns, copy on the board the mixed numbers; the improper fractions; the proper fractions.

2. Change each improper fraction to a whole or a mixed number. Tell each time what you think in changing.

3. Say the fractional unit for each proper fraction and for each improper fraction.

4. Name some like-fractions in the box.

5. Use cut-outs of circles to stand for pies. Divide equally

a. 2 pies among 3 people;
b. 3 pies among 5 people;
c. 4 pies among 6 people;
d. 2 pies among 4 people.

6. Write fractions on the board to show what part of a whole pie each person received in Ex. 5.

In Ex. 7 to 10, tell what fractional part of the group each gets for his share and how many things each gets when

7. 12 apples are divided equally among 3 boys.

8. 16 cookies are divided equally among 8 girls.

9. 24 marbles are divided equally among 6 boys.

10. 40 pencils are divided equally among 10 boys.

[W]

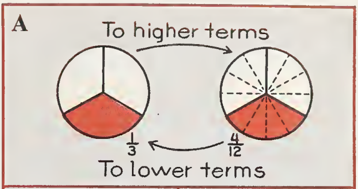
11. On your paper draw circles or squares and shade parts to show each of the following: **a.** $\frac{6}{5}$; **b.** $\frac{5}{6}$; **c.** $\frac{8}{3}$; **d.** $\frac{3}{8}$.

12. Take 192 and find $\frac{1}{8}$; $\frac{3}{8}$; $\frac{5}{8}$; $\frac{7}{8}$.

13. Take 60 and find $\frac{1}{5}$; $\frac{3}{5}$; $\frac{4}{5}$; $\frac{6}{5}$; $\frac{9}{5}$.

Studying Equal Fractions

Changing to higher or lower terms [O]



B $\frac{4\times 1}{4\times 3}=\frac{4}{12}$

C $\frac{4\div 4}{12\div 4}=\frac{1}{3}$

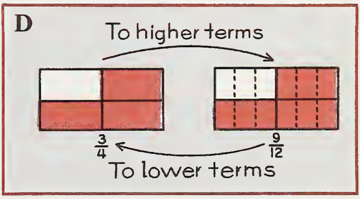
1. In the equal circles in box A, $\frac{1}{3}$ is equal to $\frac{?}{12}$.

2. In changing $\frac{1}{3}$ to twelfths, we get a smaller fractional unit. There are how many times as many pieces as we had before?

We can write, "$\frac{1}{3}=\frac{4}{12}$."

3. In changing the fraction $\frac{1}{3}$ to $\frac{4}{12}$, we have multiplied both numerator and denominator (the terms of $\frac{1}{3}$) by _?_ (box B).

4. When we change $\frac{4}{12}$ to $\frac{1}{3}$, we do just the opposite. We divide both terms of the fraction $\frac{4}{12}$ by _?_ (box C).



5. In box D, $\frac{3}{4}=\frac{?}{12}$.

6. By what number are both terms of the fraction $\frac{3}{4}$ multiplied to get the fraction $\frac{9}{12}$?

7. How is $\frac{9}{12}$ changed to $\frac{3}{4}$?

For Ex. 8–15, how did we change one fraction to another?

8. $\frac{5\times 1}{5\times 2}=\frac{5}{10}$ 9. $\frac{4\times 2}{4\times 3}=\frac{8}{12}$ 10. $\frac{2\times 5}{2\times 8}=\frac{10}{16}$ 11. $\frac{?\times 3}{?\times 5}=\frac{6}{10}$

12. $\frac{8\div 8}{16\div 8}=\frac{1}{2}$ 13. $\frac{8\div 2}{10\div 2}=\frac{4}{5}$ 14. $\frac{3\div 3}{12\div 3}=\frac{1}{4}$ 15. $\frac{4\div ?}{6\div ?}=\frac{2}{3}$

In Ex. 16 to 23, tell what was done to both terms of the first fraction to change it to the second fraction. For Ex. 16 say, "To change $\frac{5}{6}$ to the equal fraction $\frac{10}{12}$, we multiply both terms of the fraction $\frac{5}{6}$ by 2."

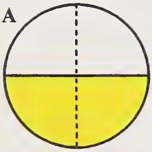
16. $\frac{5}{6}=\frac{10}{12}$ 17. $\frac{10}{16}=\frac{5}{8}$ 18. $\frac{3}{8}=\frac{6}{16}$ 19. $\frac{1}{2}=\frac{8}{16}$

20. $\frac{10}{15}=\frac{2}{3}$ 21. $\frac{1}{4}=\frac{4}{16}$ 22. $\frac{2}{5}=\frac{8}{20}$ 23. $\frac{5}{15}=\frac{1}{3}$

The Golden Rule of Fractions

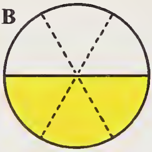
Why fractions can be changed [O]

A



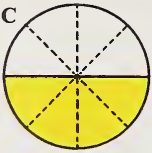
$\frac{1}{2} = \frac{2}{4}$

B



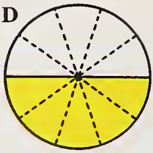
$\frac{1}{2} = \frac{3}{6}$

C



$\frac{1}{2} = \frac{4}{8}$

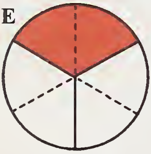
D



$\frac{1}{2} = \frac{5}{10}$

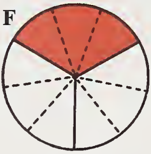
1. On the board, write the equal fractions we get when we multiply both terms of $\frac{1}{2}$ by 2; by 3; by 4; by 5 (circles A to D).

E



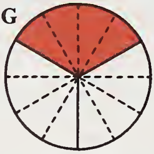
$\frac{1}{3} = \frac{2}{6}$

F



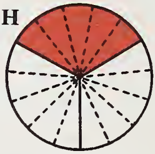
$\frac{1}{3} = \frac{3}{9}$

G



$\frac{1}{3} = \frac{4}{12}$

H



$\frac{1}{3} = \frac{5}{15}$

2. Work as in Ex. 1 for the fraction $\frac{1}{3}$ (circles E to H).

3. Name the circles which prove that each of the following statements is true:

When we multiply both terms of a fraction by 2 we get an equal fraction, because multiplying the denominator by 2 makes the fractional unit $\frac{1}{2}$ as large and multiplying the numerator by 2 gives twice as many parts.

When we multiply both terms of a fraction by 3 we get an equal fraction, because multiplying the denominator by 3 makes the fractional unit $\frac{1}{3}$ as large and multiplying the numerator by 3 gives 3 times as many parts.

4. When we divide both terms of a fraction by 3 (box I), we get an equal fraction.

On the board, show that dividing the denominator by 3 makes the fractional unit 3 times as large and dividing the numerator by 3 makes $\frac{1}{3}$ as many parts.

I

$$\frac{3 \div 3}{15 \div 3} = \frac{1}{5}$$

5. Tell in your own words what happens when you multiply both terms of a fraction by the same number.

6. Tell in your own words what happens when you divide both terms of a fraction by the same number.

If you understood the work on pages 191 and 192, you will understand this very important **Golden Rule of Fractions:**

> **Multiplying or dividing both terms of a fraction by the same number changes the form but not the value of the fraction.**

The Golden Rule of Fractions helps us to change fractions to higher terms or to lower terms without drawings or charts.

J

$$\frac{5}{8} = \frac{?}{16}$$

$$\frac{2 \times 5}{2 \times 8} = \frac{10}{16}$$

7. Change $\frac{5}{8}$ to sixteenths (box J).

Think, "The denominator 8 must be multiplied by what to get the denominator 16?"

_?_ × 8 = 16. When you know the product and one factor, how do you find the other factor? 16 ÷ 8 = ?

2 × 8 = 16. We must also multiply the numerator of $\frac{5}{8}$ by 2. Now we have for $\frac{5}{8}$ an equal fraction, $\frac{?}{16}$.

K

$$\frac{10}{15} = \frac{?}{3}$$

$$\frac{10 \div 5}{15 \div 5} = \frac{2}{3}$$

8. Change $\frac{10}{15}$ to thirds (box K).

Think, "The denominator 15 must be divided by _?_ to get the denominator 3."

15 ÷ 5 = 3. We must also divide the numerator, 10, by 5 to get the equal fraction $\frac{?}{3}$.

9. Tell what to think in changing each of the following:

a	b	c	d	e
$\frac{1}{2} = \frac{?}{16}$	$\frac{3}{4} = \frac{?}{12}$	$\frac{4}{5} = \frac{?}{10}$	$\frac{12}{16} = \frac{?}{4}$	$\frac{6}{10} = \frac{?}{5}$

[W]

Write your work for these as in boxes J and K above:

10. Change to sixteenths: **a.** $\frac{3}{8}$ **b.** $\frac{3}{4}$ **c.** $\frac{7}{8}$ **d.** $\frac{1}{2}$

11. Change to fourths: **a.** $\frac{9}{12}$ **b.** $\frac{6}{8}$ **c.** $\frac{12}{16}$ **d.** $\frac{5}{20}$

Reducing Fractions to Lowest Terms

Using the Golden Rule of Fractions [O]

1. Change, or **reduce,** $\frac{12}{15}$ (box A).

Try 2 for a divisor. Can 12 be divided evenly by 2? Yes. Can 15? No, so 2 is not the correct divisor.

Try 3. $12 \div 3 = ?$ $15 \div 3 = ?$ We can use 3 because it will divide both terms evenly.

We say that the fraction $\frac{4}{5}$ is **in lowest terms** because the only number that will divide both terms (4 and 5) evenly is 1.

A

$$\frac{12}{15} = \frac{?}{?}$$

$$\frac{12 \div 3}{15 \div 3} = \frac{4}{5}$$

2. Reduce $\frac{12}{16}$ (box B) to lowest terms.

Try 2 for a divisor. $12 \div 2 = ?$ $16 \div 2 = ?$ Dividing both terms by 2 reduces $\frac{12}{16}$ to $\frac{6}{8}$ which is **in lower terms** than $\frac{12}{16}$.

But $\frac{6}{8}$ is not in lowest terms because both terms can again be divided by 2.

Is $\frac{3}{4}$ in lowest terms? Why?

B

$$\frac{12}{16} = \frac{?}{?}$$

$$\frac{12 \div 2}{16 \div 2} = \frac{6}{8}$$

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

3. In box C, $\frac{12}{16}$ has been reduced to lowest terms in one step by using the largest number that will divide both terms evenly. What divisor was used to do this?

C

$$\frac{12}{16} = \frac{?}{?}$$

$$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$$

To reduce a fraction to lowest terms, divide both terms by the largest number that will divide both terms evenly.

4. Tell which fractions below are in lowest terms and why.

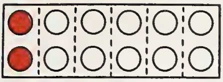
[W]

Copy and reduce to lowest terms all of the following fractions which can be reduced:

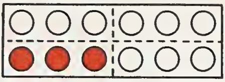
	a	b	c	d	e	f	g	h	i
5.	$\frac{5}{6}$	$\frac{8}{16}$	$\frac{10}{12}$	$\frac{10}{16}$	$\frac{7}{12}$	$\frac{4}{6}$	$\frac{8}{12}$	$\frac{9}{10}$	$\frac{6}{12}$
6.	$\frac{14}{16}$	$\frac{7}{8}$	$\frac{9}{12}$	$\frac{15}{20}$	$\frac{12}{24}$	$\frac{9}{15}$	$\frac{18}{24}$	$\frac{16}{20}$	$\frac{10}{15}$

Finding What Part One Number Is of Another

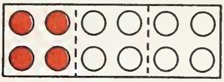
Reducing when the fraction is a measure [O]

A


$\frac{2 \div 2}{12 \div 2} = \frac{1}{6}$ dozen

B


$\frac{3 \div 3}{12 \div 3} = \frac{1}{4}$ dozen

C


$\frac{4 \div 4}{12 \div 4} = \frac{1}{3}$ dozen

1. How many oranges in 1 dozen? 1 orange is $\frac{1}{12}$ of a dozen, so 2 oranges are $\frac{?}{12}$ of a dozen (picture A). $\frac{2}{12} = \frac{1}{6}$, so 2 oranges are $\frac{?}{6}$ of a dozen.

2. Three oranges are what part of a dozen (picture B)?

3. Four oranges are what part of a dozen (picture C)?

4. Draw 12 circles on the board and shade some of them to show what part of a dozen you buy if you buy 10 oranges.

5. Under your drawing, write a fraction and reduce it to lowest terms, as for A to C above.

6. One yard equals _?_ in. What part of a yard is 1 in. (box D)? 9 in.?

7. What part of a yard is 12 in.? 18 in.? 24 in.? 27 in.? Write your work on the board, as in box D.

8. Check your work for Ex. 7 by folding a 36-inch tape measure into halves, thirds and fourths.

9. One hour = _?_ min. What part of an hour is 1 min. (box E)? 15 min.? 10 min.? 20 min.? 30 min.? 40 min.?

10. What part of $16 is $1? $2? $4? $8? $12? $14?

➤ **Extra Practice.** Work Set 63.

D

1 in. $= \frac{?}{36}$ yd.

9 in. $= \frac{9}{36}$ yd.,

or $\frac{?}{?}$ yd.

$\frac{9 \div 9}{36 \div 9} = \frac{?}{?}$

E

1 min. $= \frac{?}{60}$ hr.

15 min. $= \frac{15}{60}$ hr.,

or $\frac{?}{?}$ hr.

$\frac{15 \div 15}{60 \div 15} = \frac{?}{?}$

Candy Eggs for Easter

A. and S. of mixed numbers [W]

1. Susan is buying a large chocolate Easter egg for 45¢ and a small one for 20¢. Find her change from a dollar bill.

2. The clerk told Susan that a tray of the large chocolate eggs weighs 15 pounds and a tray of small ones weighs $6\frac{3}{4}$ pounds. What is the difference between these weights?

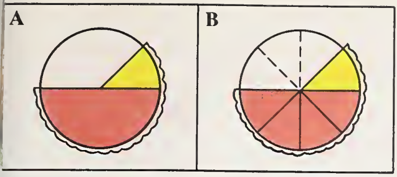
3. Does the tray of large eggs weigh more or less than two trays of small eggs? How much more or less?

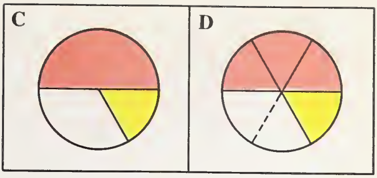
4. The average weight of the medium-sized chocolate Easter eggs is $9\frac{3}{4}$ ounces and of the large ones is $14\frac{3}{4}$ ounces. How much heavier on the average is a large Easter egg than a medium-sized one?

5. Henry bought a medium-sized egg weighing 10 ounces and a small egg weighing $6\frac{1}{4}$ ounces. Together they weighed how many ounces?

6. How much more did one of Henry's Easter eggs weigh than the other?

7. Mrs. Ames bought 3 large chocolate eggs at 45¢ each, 2 medium-sized ones at 28¢ each, and 4 small ones at 20¢ each. How much did she have to pay for the Easter eggs she bought?





Can We Add Unlike-Fractions?

Changing to the same fractional unit [O]

1. The pie tin in picture A has $\frac{1}{2}$ of a cherry pie and $\frac{1}{8}$ of a lemon pie in it. How much pie in all is that? Can you tell by looking at picture A?

In picture B, what has been done to the half cherry pie?

When the cherry pie in the tin is cut into eighths, both kinds of pie can be measured by the same fractional unit, which is $\frac{1}{8}$. Then we can count or **add like-fractions** of pie.

$$\frac{4}{8} \text{ (pie)} + \frac{1}{8} \text{ (pie)} = \frac{?}{8} \text{ (pie) in all.}$$

2. Use the colored parts of circles C and D above to explain the addition in box E.

E

$$\begin{array}{rcl} \frac{1}{2} & = & \frac{3}{6} \\ +\frac{1}{6} & = & \frac{1}{6} \\ \hline & & \frac{4}{6} = \frac{2}{3} \end{array}$$

Can the fraction $\frac{1}{2}$ be changed to $\frac{1}{6}$'s? Yes, $\frac{1}{2} = \frac{?}{6}$.

Now with $\frac{1}{6}$ as the fractional unit for both fractions, we can add.

$$\frac{3}{6} + \frac{1}{6} = \frac{?}{6}, \text{ or } \frac{?}{3}.$$

3. In box F, we want to add two $\frac{1}{3}$'s and five $\frac{1}{6}$'s.

F

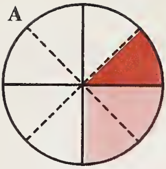
$$\begin{array}{rcl} \frac{2}{3} & = & \frac{4}{6} \\ +\frac{5}{6} & = & \frac{5}{6} \\ \hline & & \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2} \end{array}$$

Are $\frac{2}{3}$ and $\frac{5}{6}$ like-fractions? Which has the smaller fractional unit? Can $\frac{1}{3}$'s be changed to $\frac{1}{6}$'s? Yes, $\frac{1}{3} = \frac{2}{6}$, so $\frac{2}{3} = \frac{?}{6}$.

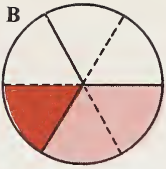
When both fractions have the same fractional unit, $\frac{1}{6}$, we can add. Explain the addition in box F.

Fractions which do not have the same fractional unit cannot be added. They must be changed so that they do have the same fractional unit.

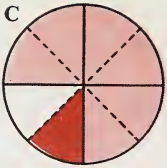
A



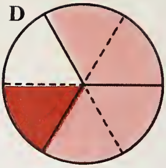
B



C



D



What Is a Common Denominator?

Changing unlike-fractions [O]

Tell which picture shows each of Ex. 1 to 4 below. Explain how the picture shows the change to be made in the example before the fractions can be added.

1. $\frac{1}{3} = \frac{2}{6}$
$+\frac{1}{6} = \frac{1}{6}$
$\frac{3}{6} = \frac{1}{2}$

2. $\frac{1}{8} = \frac{1}{8}$
$+\frac{1}{4} = \frac{2}{8}$
$\frac{3}{8}$

3. $\frac{1}{6} = \frac{1}{6}$
$+\frac{2}{3} = \frac{4}{6}$
$\frac{5}{6}$

4. $\frac{3}{4} = \frac{6}{8}$
$+\frac{1}{8} = \frac{1}{8}$
$\frac{7}{8}$

5. In each of Ex. 1 to 4 above, which fraction was changed—the fraction with the larger fractional unit or the one with the smaller fractional unit?

One day Mary, Betty, and Nancy wore red dresses. They had one thing in common, the color of their dresses.

Bob, Tom, and Jim collect stamps. They have something in common, their interest in collecting stamps.

6. Tell some interest that you have in common with a friend.

In Ex. 1 above, $\frac{1}{3}$ is changed to $\frac{2}{6}$. Then the denominator, 6, is common to the fractions $\frac{2}{6}$ and $\frac{1}{6}$, and the common fractional unit is $\frac{1}{6}$.

7. Tell the common denominator and the common fractional unit in Ex. 2 to 4 above and in Ex. 8 to 11 below.

On the board, copy and finish the following:

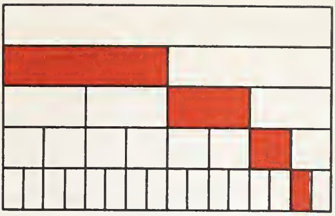
8. $\frac{3}{8} = \frac{3}{8}$
$+\frac{3}{4} = \frac{6}{8}$
$\frac{9}{8} = ?$

9. $\frac{1}{3} = \frac{2}{6}$
$+\frac{5}{6} = \frac{5}{6}$
$\frac{7}{6} = ?$

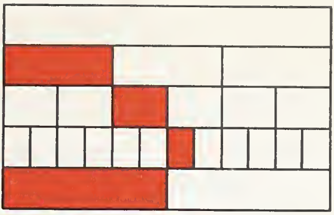
10. $\frac{3}{4} = \frac{3}{4}$
$+\frac{1}{2} = \frac{2}{4}$
$\frac{?}{4} = ?$

11. $\frac{1}{2} = \frac{4}{8}$
$+\frac{7}{8} = \frac{7}{8}$
$\frac{?}{?} = ?$

A



B



Finding Common Denominators from Charts

Related fractional units [O]

1. In chart A, the fractional units for the different rows are related. This means that, in changing to a smaller fractional unit, halves can be changed to fourths or to _?_ or to _?_.

2. Also, fourths can be changed to eighths or to _?_.

3. Eighths can be changed to _?_.

4. How do the denominators show that the fractional units for these fractions are related?

HELPER: Can 16 be divided evenly by 8? by 4? by 2?

5. Chart B shows that thirds can be changed to _?_ or _?_. Can halves be changed to $\frac{1}{12}$'s? to $\frac{1}{6}$'s? to $\frac{1}{3}$'s?

C

$$\begin{array}{rcr} \frac{1}{4} & = & \frac{4}{16} \\ +\frac{3}{16} & = & \frac{3}{16} \\ \hline & & \frac{?}{16} \end{array}$$

6. In box C, we can change $\frac{1}{4}$ to $\frac{?}{16}$. Then both fractions ($\frac{4}{16}$ and $\frac{3}{16}$) have the smaller fractional unit ($\frac{1}{16}$). The common denominator is _?_.

What is the sum? How do we find it?

[W]

Copy and add. Write the work as in box C. Use the charts if you need to in changing to common denominators.

	a	b	c	d	e	f	g	h
7.	$\frac{1}{2}$ $+\frac{1}{4}$	$\frac{1}{4}$ $+\frac{1}{8}$	$\frac{1}{8}$ $+\frac{1}{16}$	$\frac{1}{3}$ $+\frac{1}{6}$	$\frac{1}{6}$ $+\frac{1}{12}$	$\frac{1}{2}$ $+\frac{3}{8}$	$\frac{3}{8}$ $+\frac{1}{4}$	$\frac{1}{12}$ $+\frac{2}{3}$
8.	$\frac{1}{2}$ $+\frac{5}{16}$	$\frac{5}{12}$ $+\frac{1}{3}$	$\frac{7}{12}$ $+\frac{1}{6}$	$\frac{5}{16}$ $+\frac{1}{4}$	$\frac{1}{2}$ $+\frac{3}{16}$	$\frac{7}{12}$ $+\frac{1}{3}$	$\frac{5}{12}$ $+\frac{1}{6}$	$\frac{1}{2}$ $+\frac{1}{6}$

Adding Unlike-Fractions

Related fractions [O]

A

$$\begin{array}{r} \frac{7}{8} \\ \frac{5}{16} \\ +\frac{3}{4} \\ \hline \end{array}$$

1. Try to answer the questions below which Miss Hill asked Carl about Ex. A.

"What is the fractional unit for each fraction?"

"Which fractional unit is smallest, $\frac{1}{8}$, $\frac{1}{16}$, or $\frac{1}{4}$?"

"How do you know that $\frac{1}{4}$ and $\frac{1}{8}$ are related to $\frac{1}{16}$, the smallest fractional unit?"

"Why shall we have to make changes so that all the fractions will have the smallest fractional unit?"

"What number will be the common denominator?"

2. Box B shows what Carl wrote and thought in adding the fractions in box A.

Tell what Carl thought to change $\frac{7}{8}$ to $\frac{14}{16}$; to change $\frac{3}{4}$ to $\frac{12}{16}$.

Now explain the addition in box B. Check by adding the fractions upward.

B

$$\begin{array}{rcl} \frac{7}{8} & = & \frac{14}{16} \\ \frac{5}{16} & = & \frac{5}{16} \\ +\frac{3}{4} & = & \frac{12}{16} \\ \hline & & \frac{31}{16} = 1\frac{15}{16} \end{array}$$

Think:

$$\frac{2 \times 7}{2 \times 8} = \frac{14}{16}$$

$$\frac{4 \times 3}{4 \times 4} = \frac{12}{16}$$

To add fractions which are unlike but related, change to like-fractions having the smallest of the given fractional units.

[W]

Copy and add. Give all sums in best form.

	a	b	c	d	e	f	g	h
3.	$\frac{5}{8}$ $+\frac{7}{16}$	$\frac{11}{12}$ $+\frac{5}{6}$	$\frac{3}{4}$ $+\frac{9}{16}$	$\frac{2}{3}$ $+\frac{7}{12}$	$\frac{7}{8}$ $+\frac{11}{16}$	$\frac{3}{4}$ $+\frac{5}{12}$	$\frac{9}{10}$ $+\frac{4}{5}$	$\frac{7}{8}$ $+\frac{3}{4}$
4.	$\frac{1}{2}$ $\frac{7}{8}$ $+\frac{3}{4}$	$\frac{5}{8}$ $\frac{1}{4}$ $+\frac{7}{16}$	$\frac{5}{6}$ $\frac{1}{2}$ $+\frac{7}{12}$	$\frac{3}{5}$ $\frac{7}{10}$ $+\frac{1}{2}$	$\frac{7}{12}$ $\frac{1}{4}$ $+\frac{2}{3}$	$\frac{3}{4}$ $\frac{7}{8}$ $+\frac{9}{16}$	$\frac{1}{2}$ $\frac{11}{12}$ $+\frac{3}{4}$	$\frac{15}{16}$ $\frac{1}{2}$ $+\frac{5}{8}$

Extra Practice. Work Sets 65 and 66.

Subtracting Unlike-Fractions

Related fractions [O]

1. Julie had $\frac{3}{4}$ yd. of ribbon. She used $\frac{1}{8}$ yd. for a bookmark. How much ribbon was left?

$$\begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ -\frac{1}{8} = \frac{1}{8} \\ \hline \frac{5}{8} \end{array}$$

Only like-fractions can be subtracted. Are $\frac{3}{4}$ and $\frac{1}{8}$ like-fractions or unlike-fractions?

Which fraction do we change so both fractions will have the same fractional unit? Then what will be the common denominator? Explain the subtraction.

Tell what you think to subtract in row 2.

	a	b	c	d	e	f	g	h
2.	$\begin{array}{r} \frac{3}{4} \\ -\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{2} \\ -\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{3} \\ -\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{4} \\ -\frac{1}{8} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{2} \\ -\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} \frac{2}{3} \\ -\frac{1}{6} \\ \hline \end{array}$	$\begin{array}{r} \frac{7}{8} \\ -\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{2} \\ -\frac{1}{16} \\ \hline \end{array}$

[W]

Copy and subtract. Express the remainders in best form.

3.	$\begin{array}{r} \frac{7}{8} \\ \frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} \frac{5}{6} \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{9}{16} \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{11}{12} \\ \frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} \frac{1}{2} \\ \frac{3}{16} \\ \hline \end{array}$	$\begin{array}{r} \frac{7}{10} \\ \frac{3}{5} \\ \hline \end{array}$	$\begin{array}{r} \frac{2}{3} \\ \frac{5}{12} \\ \hline \end{array}$	$\begin{array}{r} \frac{3}{4} \\ \frac{5}{8} \\ \hline \end{array}$
4.	$\begin{array}{r} \frac{5}{6} \\ \frac{1}{3} \\ \hline \end{array}$	$\begin{array}{r} \frac{3}{4} \\ \frac{5}{16} \\ \hline \end{array}$	$\begin{array}{r} \frac{4}{5} \\ \frac{3}{10} \\ \hline \end{array}$	$\begin{array}{r} \frac{5}{6} \\ \frac{7}{12} \\ \hline \end{array}$	$\begin{array}{r} \frac{9}{10} \\ \frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} \frac{15}{16} \\ \frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} \frac{7}{10} \\ \frac{2}{5} \\ \hline \end{array}$	$\begin{array}{r} \frac{11}{12} \\ \frac{5}{6} \\ \hline \end{array}$

5–6. Copy rows 3 and 4 and add this time.

Finding n in Division Examples

[O]

In column a below, tell what you think to find *n*.

	a	b	c
1.	$56 \div 7 = n$	$480 \div n = 5$	$268 \div n = 67$
2.	$54 \div n = 6$	$476 \div 7 = n$	$1{,}782 \div n = 22$
3.	$42 \div 6 = n$	$224 \div n = 4$	$219 \div n = 73$
4.	$63 \div n = 9$	$448 \div 8 = n$	$1{,}968 \div 82 = n$

[W]

Do the work to find *n* in columns b and c.

Comparing Fractions That Are Measures

Unlike-fractions [W]

Write your work to find the following differences:

1. Which is heavier and how much heavier—a grapefruit weighing $\frac{11}{16}$ lb. or one weighing $\frac{7}{8}$ lb.?

HELPER. These unlike-fractions must be expressed with the same fractional unit before you can compare them easily.

2. Who lives farther from the beach and how much farther—Tom who lives $\frac{7}{10}$ mile away or Bob who lives $\frac{4}{5}$ mile away?

3. Which is wider and how much wider—a shelf $\frac{5}{6}$ ft. wide or one $\frac{11}{12}$ ft. wide?

4. Which pail holds more and how much more—one holding $\frac{3}{4}$ gal. or one holding $\frac{7}{8}$ gal.?

5. Which home movie is longer and how much longer—one lasting $\frac{2}{3}$ of an hour or one lasting $\frac{5}{6}$ of an hour?

Estimating in Adding Fractions

Unlike-fractions [O]

Without working the examples below, tell whether a sum is less than 1, between 1 and 2, or between 2 and 3. Tell how you decide. Then write your estimate on the board to use later.

	a	b	c	d	e	f	g	h
1.	$\frac{1}{10}$ $\frac{1}{5}$ $+\frac{1}{2}$	$\frac{2}{3}$ $\frac{3}{4}$ $+\frac{11}{12}$	$\frac{3}{4}$ $\frac{5}{8}$ $+\frac{1}{16}$	$\frac{1}{3}$ $\frac{1}{4}$ $+\frac{1}{12}$	$\frac{2}{3}$ $\frac{5}{12}$ $+\frac{1}{6}$	$\frac{1}{8}$ $\frac{1}{4}$ $+\frac{1}{16}$	$\frac{15}{16}$ $\frac{3}{4}$ $+\frac{7}{8}$	$\frac{1}{2}$ $\frac{1}{3}$ $+\frac{11}{12}$
2.	$\frac{7}{8}$ $\frac{1}{4}$ $+\frac{1}{16}$	$\frac{1}{6}$ $\frac{1}{4}$ $+\frac{1}{12}$	$\frac{11}{12}$ $\frac{5}{6}$ $+\frac{3}{4}$	$\frac{5}{6}$ $\frac{1}{2}$ $+\frac{1}{12}$	$\frac{1}{8}$ $\frac{1}{2}$ $+\frac{1}{4}$	$\frac{1}{2}$ $\frac{5}{6}$ $+\frac{1}{3}$	$\frac{7}{8}$ $\frac{3}{4}$ $+\frac{1}{8}$	$\frac{1}{2}$ $\frac{1}{8}$ $+\frac{1}{16}$

[W]

Copy and work rows 1 and 2. Were your estimates correct?

Extra Practice. Work Set 68.

Which Answer Is Closest?

Using rounded numbers [W]

Without working problems 1 to 5 below, copy the answer which you think is nearest to the exact answer.

1. What is the cost of 8 books at $1.98 each? $8 $10 $16

2. A truck covered 356 miles in 9 hr. That was an average of how many miles per hour? 30 40 35

3. Fred said, "I've paid $49.95 for my new bicycle and I still have $9.75 left." Fred had how much money before he bought his bicycle? $40 $50 $60

4. Ann earned $18.75 of the $50 she needed for camp. Her father paid the rest of the amount, or $ _?_. $30 $70 $20

5. Fred's father bought a television set for $318.80. He paid for it in 8 months, paying the same amount, or $ _?_, each month. $20 $30 $40

Work the problems and see how far off each estimate was.

Watch the Signs!

Cumulative review, A., S., M., D. [W]

Write an estimate for each answer. Use it to help you decide whether your exact answer is sensible.

Copy and work. Check each answer.

	a	b	c
1.	$\frac{1}{7}$ of \$5.95	7 × \$6.98	3,947 ÷ 73
2.	8 × \$0.59	856 ÷ 94	\$69.43 + \$48.15
3.	413 − 296	386 + 742 + 93	45 × \$5.29
4.	$\frac{1}{6}$ of \$39.25	30 × 43	\$30.08 − \$15.49
5.	896 + 452 + 97	1,692 ÷ 84	\$22.10 ÷ 65
6.	5 × \$9.07	\$12.15 − \$0.87	\$105.03 − \$97.58

Write word problems using the numbers in Ex. 1a to 4a.

A Real Television Show

A. and S. of mixed numbers; related unlike-fractions [O]

A

$$\begin{array}{r} 1\tfrac{1}{2} = 1\tfrac{2}{4} \\ +2\tfrac{1}{4} = 2\tfrac{1}{4} \\ \hline 3\tfrac{3}{4} \end{array}$$

B

$$\begin{array}{r} 6\tfrac{3}{4} = 6\tfrac{3}{4} \\ -5\tfrac{1}{2} = 5\tfrac{2}{4} \\ \hline 1\tfrac{1}{4} \end{array}$$

1. Ruth and Ted spent $1\frac{1}{2}$ hr. on Monday and $2\frac{1}{4}$ hr. on Tuesday rehearsing for a television show. In all, how many hours did they spend rehearsing? Explain the work in box A.

2. The microphone had to be lowered from $6\frac{3}{4}$ ft. to $5\frac{1}{2}$ ft. How much was it lowered?

Is $6\frac{3}{4}$ the sum of two addends? You know one addend is $5\frac{1}{2}$. Use box B to help you tell how to find the other addend.

Explain these examples and tell how to finish them:

3.

a

$$\begin{array}{r} 3\tfrac{1}{6} = 3\tfrac{2}{12} \\ +2\tfrac{5}{12} = 2\tfrac{5}{12} \\ \hline ? \end{array}$$

b

$$\begin{array}{r} 2\tfrac{9}{16} = 2\tfrac{9}{16} \\ +\tfrac{3}{8} = \tfrac{6}{16} \\ \hline ? \end{array}$$

c

$$\begin{array}{r} 9\tfrac{4}{5} = 9\tfrac{8}{10} \\ -2\tfrac{3}{10} = 2\tfrac{3}{10} \\ \hline 7\tfrac{5}{10} = 7\tfrac{?}{2} \end{array}$$

[W]

Write your work for the following, as in boxes A and B:

4. The announcer used $2\frac{1}{2}$ min. at the beginning of the program and $1\frac{3}{10}$ min. at the end. He used _?_ min. in all.

5. Of the $1\frac{1}{2}$-hour weekly school program, Park School uses $\frac{1}{4}$ hr. How much is used by other schools?

6. Ruth's program costume needed $3\frac{2}{3}$ yd. of material and Ted's $2\frac{1}{6}$ yd. How many yards were needed for both costumes?

Practice with Mixed Numbers

A. and S.; related unlike-fractions [O]

Tell the fraction to change in each example in rows 1–3.

	a	b	c	d	e	f
1.	$9\frac{1}{2}$ $+5\frac{3}{8}$	$4\frac{1}{6}$ $+6\frac{2}{3}$	$8\frac{4}{5}$ $-3\frac{7}{10}$	$7\frac{7}{12}$ $-4\frac{1}{3}$	$6\frac{5}{8}$ $+2\frac{3}{16}$	$3\frac{1}{8}$ $+\frac{1}{2}$
2.	$15\frac{1}{2}$ $-8\frac{7}{16}$	$20\frac{5}{6}$ $-14\frac{2}{3}$	$12\frac{1}{4}$ $+9\frac{5}{8}$	$16\frac{1}{12}$ $+7\frac{3}{4}$	$18\frac{2}{3}$ $-9\frac{5}{12}$	$7\frac{9}{16}$ $-2\frac{1}{4}$
3.	$\frac{3}{4}$ $+9\frac{1}{8}$	$18\frac{1}{2}$ $+7\frac{1}{2}$	$16\frac{7}{8}$ $-\frac{3}{4}$	$30\frac{5}{6}$ $-29\frac{1}{3}$	$\frac{5}{6}$ $+\frac{11}{12}$	$\frac{1}{2}$ $+9\frac{5}{12}$

[W]

Copy and work rows 1 to 3. Watch the signs. Be sure your final answer is in the best form. Then solve problems 4 to 7.

4. Ruth spent $\frac{3}{4}$ hr. cleaning her room, $\frac{1}{2}$ hr. washing the dishes, and $\frac{3}{4}$ hr. polishing the silver. How long in all did Ruth work at these jobs?

5. Don rode his bicycle $\frac{9}{10}$ mile to the park. On the way home he rode $\frac{3}{5}$ mile to the grocery store, then $\frac{3}{10}$ mile to his home. In all, how many miles did he ride?

6. A package of dates weighed $1\frac{1}{2}$ lb. Jean used $\frac{3}{8}$ lb. for a date loaf. That left _?_ lb. of dates.

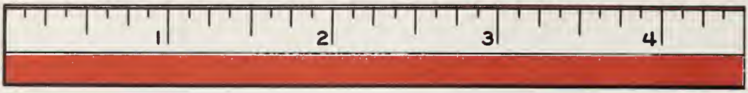
7. Mrs. Day bought $2\frac{5}{8}$ lb. of beef and $1\frac{1}{4}$ lb. of pork to make a meat loaf. How many pounds of meat did she buy? How much more beef than pork did she buy?

To Keep in Practice in Division

[W]

Copy, divide, and check.

	a	b	c	d	e
1.	$23\overline{)989}$	$42\overline{)1,008}$	$70\overline{)\$26.60}$	$84\overline{)7,794}$	$63\overline{)4,790}$
2.	$80\overline{)7,054}$	$92\overline{)\$84.64}$	$51\overline{)\$47.43}$	$73\overline{)3,840}$	$34\overline{)1,040}$



Carrying in Adding a Fraction to a Mixed Number

Related unlike-fractions [O]

1. Susan put a white border next to a red border around her picture. The white border was $2\frac{3}{4}$ in. wide and the red border $\frac{7}{8}$ in. wide. How wide were the two borders together?

Use the ruler to add. Find $2\frac{3}{4}$ inches on the ruler. Then count to the right seven of the $\frac{1}{8}$-inch spaces. $2\frac{3}{4} + \frac{7}{8} = ?$

Without a ruler, we add as in the box. Why must we change $\frac{3}{4}$ to $\frac{6}{8}$ before we can add the fractions?

The sum of the fractions is $\frac{?}{8}$. This equals what mixed number?

Side work

$\frac{13}{8} = 1\frac{?}{8}$

$$\begin{array}{rcl} 2\frac{3}{4} & = & 2\frac{6}{8} \\ +\frac{7}{8} & = & \frac{7}{8} \\ \hline & & 2\frac{13}{8} = 2 + 1\frac{5}{8} = 3\frac{5}{8} \end{array}$$

Why is $3\frac{5}{8}$ better form for the sum than $2\frac{13}{8}$?

Is $3\frac{5}{8}$ the sum you found by adding on the ruler?

Explain the examples in row 2 and tell how to finish each. Then check the answers by using the ruler at the top of the page.

2.

a

$$\begin{array}{rcl} 1\frac{1}{2} & = & 1\frac{2}{4} \\ +\frac{3}{4} & = & \frac{3}{4} \\ \hline & & 1\frac{5}{4} = ? \end{array}$$

b

$$\begin{array}{rcl} 3\frac{1}{2} & = & 3\frac{4}{8} \\ +\frac{5}{8} & = & \frac{5}{8} \\ \hline & & 3\frac{9}{8} = ? \end{array}$$

c

$$\begin{array}{rcl} 3\frac{3}{4} & = & 3\frac{6}{8} \\ +\frac{5}{8} & = & \frac{5}{8} \\ \hline & & ? \end{array}$$

[W]

Copy and add. Be sure each answer is in best form.

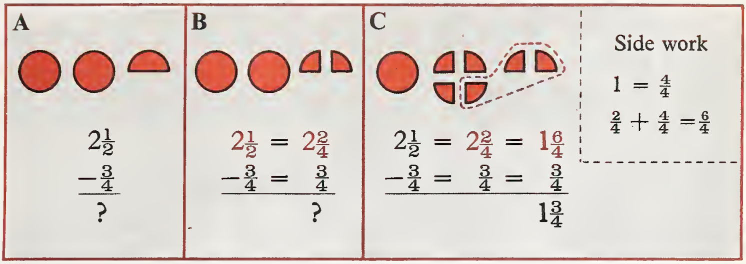
	a	b	c	d	e	f	g
3.	$6\frac{3}{4}$ $+\frac{3}{8}$	$\frac{5}{6}$ $+8\frac{2}{3}$	$\frac{5}{8}$ $+4\frac{3}{4}$	$4\frac{7}{8}$ $+\frac{1}{2}$	$5\frac{1}{2}$ $+\frac{5}{6}$	$3\frac{1}{8}$ $+\frac{3}{4}$	$\frac{5}{6}$ $+8\frac{1}{3}$
4.	$1\frac{7}{8}$ $+\frac{1}{4}$	$5\frac{7}{8}$ $+\frac{3}{4}$	$\frac{1}{2}$ $+5\frac{1}{6}$	$3\frac{1}{3}$ $+\frac{5}{6}$	$\frac{1}{2}$ $+7\frac{5}{8}$	$\frac{3}{4}$ $+2\frac{1}{2}$	$\frac{7}{8}$ $+6\frac{1}{2}$

Subtracting a Fraction from a Mixed Number

Related unlike-fractions; borrowing [O]

1. Use the ruler at the top of page 206 to help you subtract $\frac{3}{4}$ from $2\frac{1}{2}$. From the $2\frac{1}{2}$-inch mark, count to the left three of the $\frac{1}{4}$-inch spaces. This brings you to $1\frac{3}{4}$, so $2\frac{1}{2} - \frac{3}{4} = ?$

2. Box A shows the subtraction example. Can you show the subtraction by covering 3 fourths in that diagram? Why not?



A: $\begin{array}{r} 2\frac{1}{2} \\ -\frac{3}{4} \\ \hline ? \end{array}$

B: $\begin{array}{rcr} 2\frac{1}{2} & = & 2\frac{2}{4} \\ -\frac{3}{4} & = & \frac{3}{4} \\ \hline & & ? \end{array}$

C: $\begin{array}{rcrcr} 2\frac{1}{2} & = & 2\frac{2}{4} & = & 1\frac{6}{4} \\ -\frac{3}{4} & = & \frac{3}{4} & = & \frac{3}{4} \\ \hline & & & & 1\frac{3}{4} \end{array}$

Side work

$1 = \frac{4}{4}$

$\frac{2}{4} + \frac{4}{4} = \frac{6}{4}$

3. In box B, why was the $2\frac{1}{2}$ changed to $2\frac{2}{4}$? Now, can you cover 3 fourths in that diagram?

4. Explain how the $2\frac{2}{4}$ (box C) was changed to $1\frac{6}{4}$ in the diagram and in the side work.

Explain the examples in row 5 and tell how to finish each. Then check your answer for Ex. 5a by subtracting on the ruler.

5.

a. $\begin{array}{rcrcr} 3\frac{1}{4} & = & 3\frac{2}{8} & = & 2\frac{10}{8} \\ -\frac{7}{8} & = & \frac{7}{8} & = & \frac{7}{8} \\ \hline & & & & ? \end{array}$

b. $\begin{array}{rcrcr} 2\frac{1}{6} & = & 2\frac{1}{6} & = & 1\frac{7}{6} \\ -\frac{2}{3} & = & \frac{4}{6} & = & \frac{4}{6} \\ \hline & & & & 1\frac{?}{6} = 1\frac{?}{2} \end{array}$

c. $\begin{array}{rcrcr} 2\frac{1}{6} & = & 2\frac{1}{6} & = & 1\frac{7}{6} \\ -\frac{1}{2} & = & \frac{3}{6} & = & \frac{3}{6} \\ \hline & & & & 1\frac{?}{6} = 1\frac{?}{3} \end{array}$

[W]

Copy and subtract. Be sure each answer is in the best form.

	a	b	c	d	e	f	g
6.	$2\frac{1}{3}$ $-\frac{5}{6}$	$3\frac{1}{6}$ $-\frac{1}{3}$	$3\frac{1}{4}$ $-\frac{5}{8}$	$2\frac{1}{2}$ $-\frac{3}{4}$	$4\frac{1}{2}$ $-\frac{5}{8}$	$1\frac{5}{6}$ $-\frac{2}{3}$	$2\frac{1}{8}$ $-\frac{1}{2}$
7.	$4\frac{3}{8}$ $-\frac{1}{2}$	$5\frac{2}{3}$ $-\frac{5}{6}$	$6\frac{7}{8}$ $-\frac{1}{2}$	$2\frac{5}{8}$ $-\frac{3}{4}$	$1\frac{1}{4}$ $-\frac{7}{8}$	$5\frac{1}{8}$ $-\frac{3}{4}$	$4\frac{1}{2}$ $-\frac{5}{6}$

Harold Weighs His Rabbits

A. and S. of mixed numbers with carrying or borrowing [O]

1. One of Harold's rabbits weighs $2\frac{3}{4}$ lb. The other weighs $3\frac{5}{8}$ lb. Together they weigh how many pounds?

Explain the work (box A). How is $5\frac{11}{8}$ changed to $6\frac{3}{8}$?

A

$$\begin{array}{rcl} 2\frac{3}{4} & = & 2\frac{6}{8} \\ +3\frac{5}{8} & = & 3\frac{5}{8} \\ \hline & & 5\frac{11}{8} = 5 + 1\frac{3}{8} = 6\frac{3}{8} \end{array}$$

Side work

$\frac{11}{8} = 1\frac{?}{8}$

2. One of these rabbits weighs how many pounds more than the other?

Explain the work (box B). What change can we make to get enough eighths to subtract from?

B

Side work

$1 = \frac{8}{8};\ \frac{8}{8} + \frac{5}{8} = \frac{13}{8}$

$$\begin{array}{rcccl} 3\frac{5}{8} & = & 3\frac{5}{8} & = & 2\frac{13}{8} \\ -2\frac{3}{4} & = & 2\frac{6}{8} & = & 2\frac{6}{8} \\ \hline & & & & \frac{7}{8} \end{array}$$

[W]

Copy and add or subtract.

	a	b	c	d	e	f	g
3.	$\begin{array}{r} 2\frac{3}{8} \\ +1\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{1}{2} \\ +1\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{1}{4} \\ -5\frac{7}{8} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{1}{3} \\ -2\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 6\frac{5}{8} \\ +1\frac{3}{4} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{2}{3} \\ +2\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 15\frac{3}{4} \\ -9\frac{7}{8} \\ \hline \end{array}$
4.	$\begin{array}{r} 8\frac{1}{4} \\ -1\frac{5}{8} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{6} \\ -8\frac{2}{3} \\ \hline \end{array}$	$\begin{array}{r} 3\frac{5}{6} \\ +8\frac{5}{6} \\ \hline \end{array}$	$\begin{array}{r} 8\frac{1}{6} \\ +9\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 10\frac{7}{8} \\ -6\frac{1}{2} \\ \hline \end{array}$	$\begin{array}{r} 9\frac{1}{4} \\ -\frac{3}{8} \\ \hline \end{array}$	$\begin{array}{r} 7\frac{1}{2} \\ +\frac{5}{8} \\ \hline \end{array}$

Harder Addition of Mixed Numbers

Related unlike-fractions [O]

1. Explain each step in the addition in the box. Where did $\frac{15}{12}$ in the side work come from? How is the side-work answer used?

$$\begin{array}{rl} 9\frac{7}{12} & = 9\frac{7}{12} \\ +2\frac{2}{3} & = 2\frac{8}{12} \\ \hline & 11\frac{15}{12} = 11 + 1\frac{1}{4} = 12\frac{1}{4} \end{array}$$

Side work

$\frac{15}{12} = 1\frac{3}{12} = 1\frac{1}{4}$

[W]

Copy and add. Write the side work for each example.

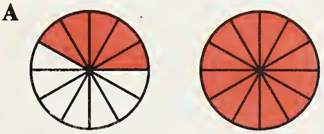
	a	b	c	d	e	f
2.	$8\frac{3}{5}$ $+3\frac{7}{10}$	$6\frac{5}{12}$ $+5\frac{2}{3}$	$9\frac{3}{16}$ $+2\frac{7}{8}$	$7\frac{1}{10}$ $+4\frac{2}{5}$	$5\frac{3}{4}$ $+1\frac{11}{12}$	$3\frac{5}{16}$ $+\frac{3}{4}$
3.	$15\frac{7}{12}$ $+8\frac{5}{6}$	$10\frac{9}{16}$ $+3\frac{7}{8}$	$14\frac{2}{5}$ $+6\frac{7}{10}$	$20\frac{5}{12}$ $+13\frac{5}{6}$	$24\frac{3}{8}$ $+9\frac{7}{16}$	$13\frac{7}{12}$ $+9\frac{2}{3}$

➤ **Extra Practice.** Work Set 70.

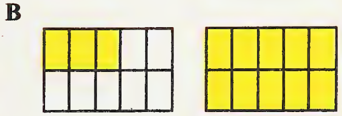
Getting Ready for Harder Subtraction

Smaller fractional units [O]

1. Use the colored parts of the drawings in each of boxes A and B to explain the examples under them.



$\frac{5}{12}$ plus $\frac{12}{12} = \frac{?}{12}$



3 tenths plus 10 tenths $= \frac{?}{10}$

Find the missing number and tell what you think as you work.

	a	b	c
2.	$\frac{7}{10} + \frac{10}{10} = \frac{?}{10}$	$2\frac{7}{10} = 1\frac{?}{10}$	$3\frac{5}{6} = 2\frac{?}{6}$
3.	$\frac{7}{8} + \frac{8}{8} = \frac{?}{8}$	$3\frac{5}{8} = 2\frac{?}{8}$	$2\frac{9}{10} = 1\frac{?}{10}$
4.	$\frac{9}{16} + \frac{16}{16} = \frac{?}{16}$	$2\frac{3}{16} = 1\frac{?}{16}$	$4\frac{5}{12} = 3\frac{?}{12}$
5.	$\frac{11}{12} + \frac{12}{12} = \frac{?}{12}$	$5\frac{7}{12} = 4\frac{?}{12}$	$3\frac{15}{16} = 2\frac{?}{16}$

Harder Subtraction of Mixed Numbers

Borrowing with smaller fractional units [O]

$$\begin{array}{rcrcr} 9\frac{5}{12} & = & 9\frac{5}{12} & = & 8\frac{17}{12} \\ -3\frac{2}{3} & = & 3\frac{8}{12} & = & 3\frac{8}{12} \\ \hline & & & & 5\frac{9}{12} = 5\frac{3}{4} \end{array}$$

Side work

$1 = \frac{12}{12}$

$\frac{5}{12} + \frac{12}{12} = \frac{17}{12}$

1. In the example in the box, why is 12 the common denominator?

2. What do we think to change $\frac{2}{3}$ to twelfths?

3. Explain why we change $9\frac{5}{12}$ to $8\frac{17}{12}$. Use the side work in the box to help you tell what to think to make the change.

[W]

Copy and subtract. Write the side work if it helps you. Be sure to leave the answer in best form.

	a	b	c	d	e	f
4.	$8\frac{11}{16}$ $-3\frac{7}{8}$	$12\frac{2}{3}$ $-9\frac{11}{12}$	$17\frac{3}{10}$ $-8\frac{2}{5}$	$10\frac{5}{6}$ $-9\frac{11}{12}$	$21\frac{5}{8}$ $-13\frac{15}{16}$	$17\frac{3}{5}$ $-8\frac{9}{10}$
5.	$32\frac{5}{12}$ $-19\frac{3}{4}$	$20\frac{3}{8}$ $-4\frac{9}{16}$	$16\frac{1}{10}$ $-7\frac{4}{5}$	$29\frac{1}{3}$ $-18\frac{5}{12}$	$24\frac{1}{6}$ $-19\frac{7}{12}$	$7\frac{3}{4}$ $-6\frac{15}{16}$

6–7. Now copy without minus signs and add in rows 4 and 5.

➤ **Extra Practice.** Work Set 71.

Practice in Estimating Quotients

[O]

Estimate each quotient by telling between what two numbers it comes. For Ex. 1a say, "415 tens ÷ 78 = more than 5 tens, so the quotient for 4,154 ÷ 78 is between 50 and 60."

	a	b	c	d	e
1.	$78\overline{)4{,}154}$	$86\overline{)7{,}196}$	$42\overline{)966}$	$93\overline{)6{,}275}$	$92\overline{)7{,}395}$
2.	$54\overline{)3{,}975}$	$73\overline{)4{,}060}$	$34\overline{)857}$	$64\overline{)5{,}846}$	$78\overline{)5{,}473}$

[W]

Now copy, divide, and check the examples in rows 1 and 2.

Addition of Three Mixed Numbers

Related unlike-fractions [O]

$$\begin{array}{rcl} 4\frac{2}{3} & = & 4\frac{8}{12} \\ 1\frac{7}{12} & = & 1\frac{7}{12} \\ +2\frac{3}{4} & = & 2\frac{9}{12} \\ \hline & & 7\frac{24}{12} = 7 + 2 = 9 \end{array}$$

Side work

$\frac{24}{12} = 2$

1. In the box, what is the fractional unit for each fraction to be added?

2. Which is the smallest of the fractional units—$\frac{1}{3}$, $\frac{1}{12}$ or $\frac{1}{4}$? Can both thirds and fourths be changed to twelfths, the smallest unit?

3. Tell how to change thirds and fourths to twelfths.

4. Explain each step of the work in the box.

[W]

Copy and add in rows 5 and 6. Write each sum in best form.

	a	b	c	d	e	f
5.	$2\frac{1}{8}$ $1\frac{3}{4}$ $+4\frac{1}{2}$	$3\frac{1}{6}$ $\frac{2}{3}$ $+7\frac{5}{12}$	$\frac{3}{16}$ $3\frac{1}{2}$ $+1\frac{3}{4}$	$1\frac{5}{8}$ $4\frac{7}{16}$ $+3\frac{1}{4}$	$7\frac{1}{2}$ $2\frac{3}{10}$ $+\ \frac{4}{5}$	$1\frac{7}{12}$ $3\frac{3}{4}$ $+6\frac{1}{2}$
6.	$\frac{5}{6}$ $1\frac{1}{4}$ $+4\frac{7}{12}$	$1\frac{3}{4}$ $4\frac{7}{8}$ $+3\frac{9}{16}$	$2\frac{1}{5}$ $4\frac{9}{10}$ $+\frac{1}{2}$	$6\frac{1}{3}$ $2\frac{11}{12}$ $+1\frac{3}{4}$	$\frac{7}{8}$ $5\frac{1}{4}$ $+3\frac{5}{16}$	$4\frac{1}{2}$ $8\frac{9}{16}$ $+1\frac{7}{8}$

Extra Practice. Work Set 72.

What is n, the Missing Number?

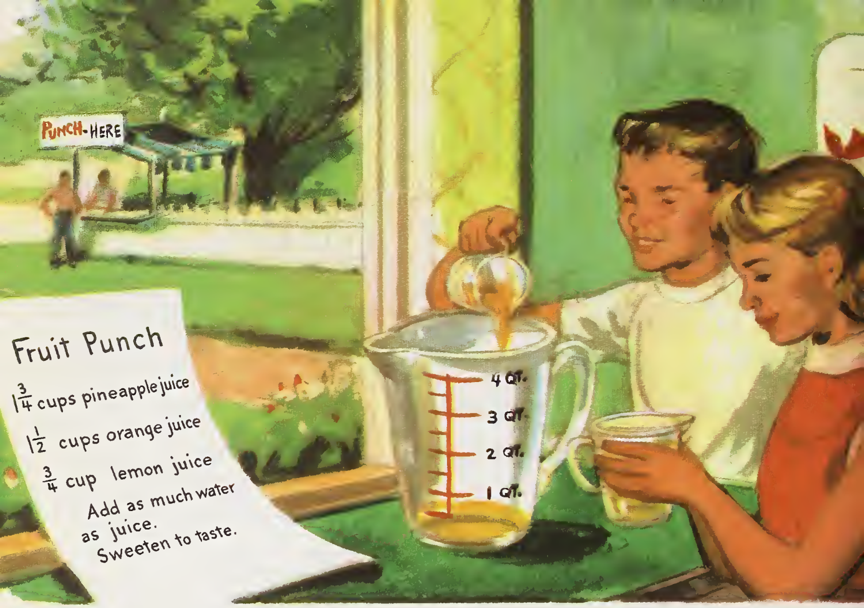
Practice in D. [O]

Tell what to do to find *n* in each example. Show each time that we know the product and one factor.

1. n × 8 = \$72.40
2. \$48.86 ÷ 7 = n
3. n × 9 = \$59.13
4. n × 54 = 4,320
5. 2,210 ÷ n = 65
6. 7,200 ÷ 80 = n
7. 73 × n = 3,285
8. 5,248 ÷ n = 82
9. 5,022 ÷ n = 93

[W]

Do the work to find *n* in each example.


PUNCH-HERE
Fruit Punch
$1\frac{3}{4}$ cups pineapple juice
$1\frac{1}{2}$ cups orange juice
$\frac{3}{4}$ cup lemon juice
Add as much water as juice.
Sweeten to taste.
4 QT.
3 QT.
2 QT.
1 QT.

Jean and Jay Sell Punch

Using fractions with measures [W]

1. Jean and Jay are making more punch to sell. How many cups of liquid does the recipe make before the sugar is added?

2. They are going to double the recipe because sales are so good. How many cups of each kind of juice will they need?

3. In all, they will use _?_ cups of juice.

4. Jean and Jay are also selling icebox cookies with their punch. Jay's mother baked $1\frac{5}{8}$ lb.; Jean's mother, $1\frac{3}{4}$ lb.; and Jean, $\frac{7}{8}$ lb. How many pounds of cookies were there?

5. The children started selling punch at 2:30 P.M. and stopped at 4:45. For how long did they sell punch?

6. Jean and Jay made $24\frac{1}{2}$ cups of punch in all. At the end of the sale they had $3\frac{1}{2}$ cups. How much punch did they sell?

7. They also had $1\frac{3}{8}$ lb. of cookies left at the end of the sale. How many pounds of cookies had they sold?

Can You Find the Mistakes?

[O]

Tell what is wrong in each of Ex. 1 to 5.

1.
$$\begin{array}{rcrcr} 7\frac{3}{4} & = & 7\frac{9}{12} & = & 7\frac{21}{12} \\ -5\frac{11}{12} & = & 5\frac{11}{12} & = & 5\frac{11}{12} \\ \hline & & & & 2\frac{10}{12} = 2\frac{5}{6} \end{array}$$

2.
$$\begin{array}{rcrcr} 9\frac{5}{8} & = & 9\frac{10}{16} & = & 8\frac{20}{16} \\ -2\frac{13}{16} & = & 2\frac{13}{16} & = & 2\frac{13}{16} \\ \hline & & & & 6\frac{7}{16} \end{array}$$

3.
$$\begin{array}{rcr} 5\frac{7}{10} & = & 5\frac{7}{10} \\ 3\frac{1}{2} & = & 3\frac{5}{10} \\ +6\frac{4}{5} & = & 6\frac{6}{10} \\ \hline & & 14\frac{18}{10} = 15\frac{4}{5} \end{array}$$

4.
$$\begin{array}{rcr} 9\frac{2}{3} & = & 9\frac{4}{6} \\ 7\frac{1}{2} & = & 7\frac{3}{6} \\ +8\frac{5}{6} & = & 8\frac{5}{6} \\ \hline & & 24\frac{12}{6} = 25 \end{array}$$

5.
$$\begin{array}{rcr} 8\frac{5}{12} & = & 8\frac{5}{12} \\ 5\frac{2}{3} & = & 5\frac{8}{12} \\ +\frac{3}{4} & = & \frac{9}{12} \\ \hline & & 13\frac{22}{12} \end{array}$$

[W]

Copy and work each of Ex. 1–5 correctly.

Frank Makes Some Candy

A. and S. of mixed numbers with related unlike-fractions [W]

1. Frank used $\frac{7}{8}$ lb. of brown sugar and $2\frac{1}{2}$ lb. of white sugar in making some candy. How many pounds of sugar did he use?

2. Frank opened a full quart bottle of milk and used $1\frac{1}{4}$ pints. How much milk was left?

3. After Frank used $\frac{5}{16}$ lb. of nut meats for his candy, he had $\frac{7}{8}$ lb. left. How many pounds of nut meats were there at first?

4. It took $\frac{3}{4}$ hr. to make the candy and $1\frac{1}{2}$ hr. for it to harden and cool. How long was it from the time Frank started to make the candy until it was ready to be eaten? How much longer did it take the candy to harden and cool than it took to make it?

5. Frank gave $1\frac{1}{4}$ lb. of candy to his grandmother and $\frac{7}{8}$ lb. to his aunt. In all, Frank gave them _?_ pounds. How much more did he give to his grandmother than to his aunt?

6. How many ounces are there in $\frac{7}{8}$ lb.? in $1\frac{1}{4}$ lb.?

7. Which is more, $1\frac{1}{2}$ lb. or 20 oz.? How much more?

Problems about Children's Weights

A. and S. of mixed numbers [W]

Work the problems these children made up. Then make up and work two problems about your own weight.

1. Sue: Last June I weighed $56\frac{3}{4}$ pounds. Since that time I've gained $3\frac{1}{2}$ pounds. How much do I weigh now?

2. Fred: I weigh $51\frac{7}{8}$ pounds now. The nurse says that I weigh $4\frac{1}{2}$ pounds less than the average for my age and height. What is the average weight for my age and height?

3. Sally: My mother weighs 116 pounds. I weigh $60\frac{3}{4}$ pounds. How much heavier is my mother than I am?

4. Jack: Before I was sick, I weighed $67\frac{1}{2}$ pounds. Now I weigh $64\frac{7}{8}$ pounds. How many pounds did I lose?

5. Helen: In September I gained $1\frac{1}{2}$ pounds; in October, $2\frac{3}{16}$ pounds; and in November, $1\frac{3}{4}$ pounds. How much did I gain?

6. Tom: Six months ago I weighed $58\frac{1}{2}$ pounds. Now I weigh $64\frac{1}{2}$ pounds. What has been my average gain per month?

Estimating in Subtracting Mixed Numbers

[O]

In Ex. 1a below, can we take $\frac{5}{8}$ (or $\frac{10}{16}$) from $\frac{3}{16}$? What will the whole-number part of the answer be? Why?

Tell the whole-number part of each answer in rows 1 and 2.

	a	b	c	d	e	f
1.	$9\frac{3}{16}$ $-2\frac{5}{8}$	$8\frac{4}{5}$ $-3\frac{7}{10}$	$8\frac{1}{3}$ $-6\frac{11}{12}$	$7\frac{1}{6}$ $-4\frac{7}{12}$	$10\frac{3}{4}$ $-2\frac{5}{8}$	$5\frac{3}{10}$ $-1\frac{1}{2}$
2.	$11\frac{3}{5}$ $-4\frac{7}{10}$	$9\frac{2}{3}$ $-6\frac{7}{12}$	$10\frac{3}{4}$ $-5\frac{13}{16}$	$7\frac{5}{6}$ $-1\frac{2}{3}$	$23\frac{1}{5}$ $-8\frac{3}{10}$	$12\frac{1}{4}$ $-8\frac{7}{8}$

[W]

Copy rows 1–2 and subtract. Were your estimates correct?

3–4. Copy rows 1 and 2 without the minus signs and add.

The School Glee Club

1- and 2-step problems [W]

Estimate each answer before you work the example.

1. In the Park-School Glee Club there are 24 boys and $\frac{1}{2}$ as many girls. How many children are in the Glee Club?

2. One book used by the Glee Club costs $1.87, another $1.98, and another $1.55. What is the average cost of a book?

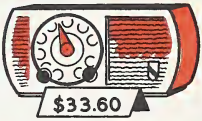
3. The Park School bought 16 records a year for 3 yr. At an average cost of $1.25, how much did the records cost?

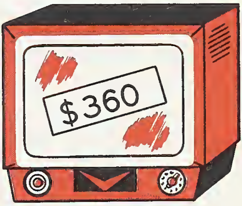
4. The Lake School has a collection of 80 records which cost a total of $92.00. What was the average cost per record?

5. Bob looked at a radio costing $36.87 and at a record player costing $89. How much less was the radio than the record player?

6. In order to pay for the radio in 4 months, Fred will have to save an average of how much money each month?

7. Jane's family bought this television set and paid for it at the rate of $24 a month. How many months more than a year did it take them to pay for it?





Can You Think Straight?

[W]

Do the work to find the value of *n*.

	a	b	c
1.	$n \times 52 = 3{,}744$	$n + 2\frac{5}{8} = 10\frac{1}{4}$	$2{,}772 \div n = 44$
2.	$4{,}374 \div 54 = n$	$n - 6\frac{3}{5} = 2\frac{7}{10}$	$82 \times n = \$35.26$
3.	$44 \times n = 2{,}332$	$7\frac{2}{3} + n = 9\frac{5}{6}$	$7{,}050 \div n = 94$
4.	$5{,}360 \div n = 67$	$8\frac{5}{12} - n = 6$	$n \times 42 = 1{,}512$
5.	$64 \times \$8.90 = n$	$5\frac{3}{16} - 2\frac{7}{8} = n$	$5{,}580 \div 93 = n$

A Circus in the Backyard

Problem-solving; missing numbers and extra numbers [O]

Tell which problems below need numbers to be solved. Tell also which problems have numbers that are not needed.

1. The children in the picture are getting ready to give a circus in Judy's backyard. If they charge 5¢ admission, how much money will they take in?

2. Janice used cardboard and cut out different kinds of wild animals. Then she made cages for each kind. If each cage has 24 bars, how many bars will she need for all the cages?

3. Ned is going to be a clown. He is planning to wear 3 of his father's old hats. If his father wears a size $7\frac{1}{4}$ hat, and Ned wears size $6\frac{3}{8}$, what is the difference between their sizes?

4. Ned put a pillow over his stomach and used his father's belt. How long is the belt if it is $8\frac{1}{2}$ inches too long for Ned?

5. To make a trapeze, a bar was fastened to 2 ropes that were tied to a tree branch. The bar was $3\frac{1}{2}$ feet from the branch and $4\frac{1}{4}$ feet from the ground. How high was the branch?

6. The children who came to the circus sat 6 in a row. How many rows of children were there watching the circus?

[W]

Make up numbers for the problems needing them and then do the work to solve all the problems.

Do You Understand?

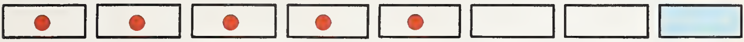
Test of Information and Meaning 5

1. What number is 1,000 larger than 99,544?

2. What number is 100 times 4,782?

3. What part of the group of rectangles below is colored?

4. There are dots in what part of the group of rectangles?



5. Change $\frac{12}{16}$ to lowest terms.

6. Change $\frac{12}{4}$ to a whole number.

7. Change $\frac{10}{3}$ to a mixed number.

8. What is the difference between $\frac{3}{4}$ and $\frac{1}{2}$?

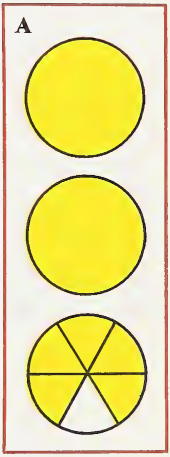
9. How many quarters in $2.50?

10. From 9 A.M. to 11:30 A.M. = _?_ hr.

11. From 10 A.M. to 2 P.M. = _?_ hr.

12. From 6 P.M. today to 6 P.M. tomorrow is _?_ hr.

13. What mixed number is shown by the colored parts of the circles in box A?



14. A piece of ribbon $\frac{1}{4}$ yd. long is how much longer than a piece $\frac{1}{8}$ yd. long?

15. Write the first partial dividend for the division example in box B.

16. The whole quotient for Ex. B will be a number between _?_ tens and _?_ tens.

17. What is the common denominator for the fractions in Ex. C?

18. A 2-pound bag of potato chips will make how many $\frac{1}{2}$-pound bags?

B

$$83\overline{)4{,}512}$$

C

$$\begin{array}{r} 2\frac{1}{2} \\ 3\frac{1}{5} \\ \underline{+1\frac{3}{10}} \end{array}$$

Do You Make Mistakes?

Diagnostic Test 5

Copy and work. You need not check your answers.

	a	b	c	Study Pages	Practice Sets
1.	$41\overline{)297}$	$22\overline{)494}$	$21\overline{)\$8.82}$	176-178; 185	53, 54
2.	$82\overline{)1,978}$	$51\overline{)\$22.44}$	$73\overline{)1,699}$	180-182; 185	55, 59
3.	$92\overline{)3,158}$	$74\overline{)\$41.44}$	$84\overline{)5,217}$	183-185	56-59
4.	$73\overline{)5,164}$	$87\overline{)\$4.35}$	$56\overline{)2,280}$	186	60
5.	$\frac{7}{16} + \frac{3}{8}$	$\frac{2}{3} + \frac{5}{6}$	$\frac{5}{6} - \frac{7}{12}$	197-201	65, 67
6.	$2\frac{7}{12} + \frac{1}{4}$	$6\frac{1}{5} + 2\frac{3}{10}$	$4\frac{2}{3} - 2\frac{1}{6}$	204	69
7.	$4\frac{5}{6} + \frac{2}{3}$	$7\frac{5}{8} - \frac{3}{4}$	$\frac{5}{6} + 9\frac{7}{12}$	206, 207	
8.	$8\frac{3}{10} - 1\frac{4}{5}$	$8\frac{9}{16} + 3\frac{5}{8}$	$4\frac{7}{12} - 3\frac{5}{6}$	208-210	70, 71

Can You Solve Problems?

Problem Test 5

Read and think carefully as you work problems 1 to 10.

1. The box shows the number of children from 4 schools who went to see a parade. What was the total number from these schools?

Lawson	410
Adams	270
Central	294
Hudson	289

2. Of the Lawson School children, 197 were boys. How many girls were there?

3. The Adams School children went to the parade in groups of 30 children each. How many groups of children were there?

4. Each of the Central School children wore a badge. If 21 children shared equally the work of making all the badges, how many badges were made by each child?

5. The Hudson School children paid 35¢ each for bus fare. How much did the 289 children pay for bus fare?

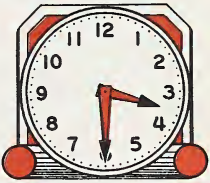
6. Tom counted 28 players in one parade band, 24 in another, 18 in another, and 30 in another. What was the average number of players per band?

7. Jean counted 8 floats with 5 people riding on each, and 6 floats with 7 people on each. How many people were riding on these floats?

8. The parade marched $\frac{3}{4}$ mi. on Crescent Street, $2\frac{1}{2}$ mi. on Main Street and $\frac{3}{4}$ mi. on Market Street. What was the total number of miles the parade marched?

9. How much farther did the parade go on Main Street than on Market Street?

10. The clock on the city hall looked this way when the parade was over. The parade started at 1:30 P.M. How many minutes had it lasted?



How Well Can You Figure?

Computation Test 5

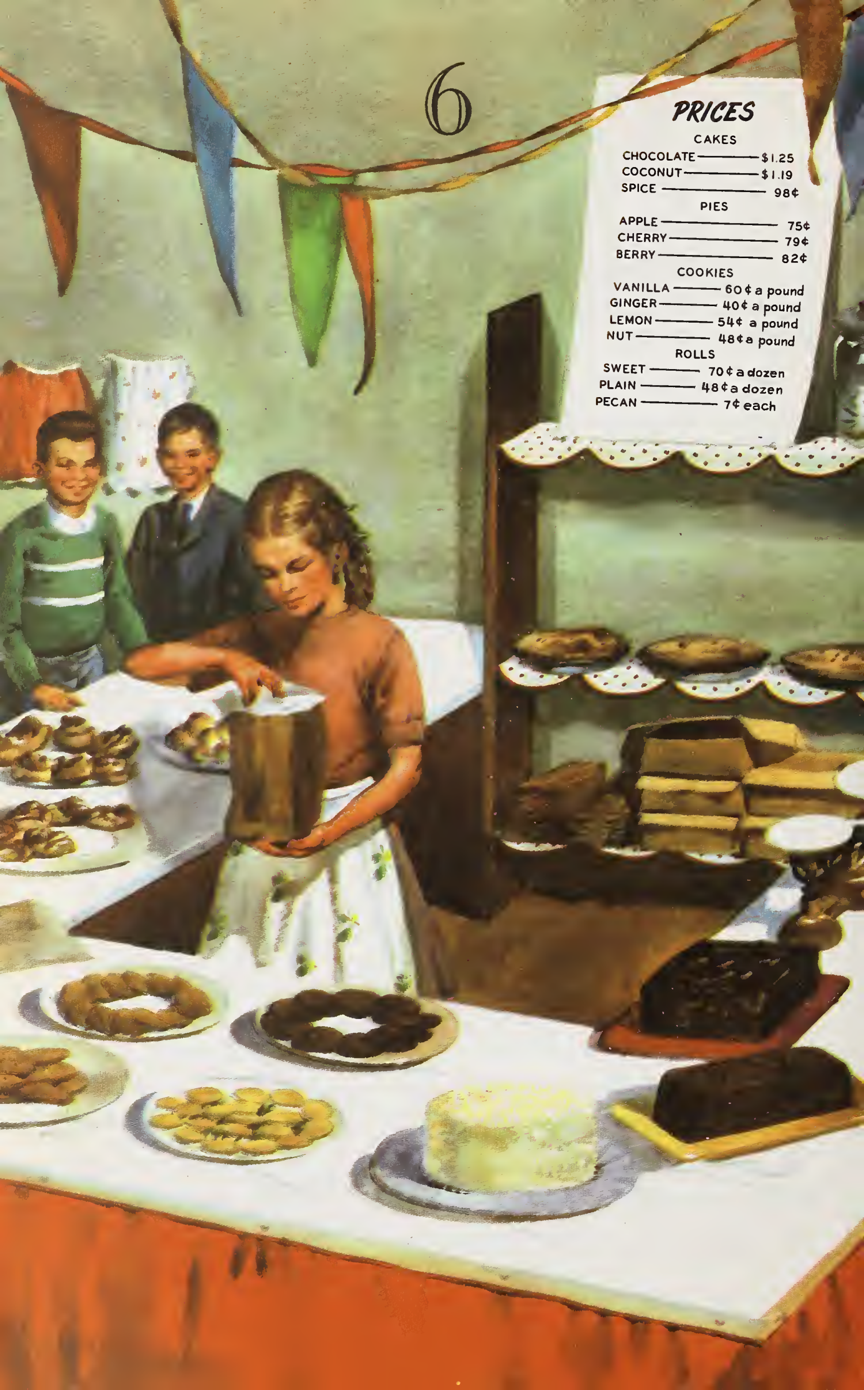
Copy and work. You need not check your answers.

1. $\begin{array}{r} \$75.06 \\ -9.48 \\ \hline \end{array}$ **2.** $\begin{array}{r} \$53.48 \\ \times 7 \\ \hline \end{array}$ **3.** $90\overline{)540}$ **4.** $\begin{array}{r} 78 \\ \times 39 \\ \hline \end{array}$ **5.** $\begin{array}{r} 4\frac{7}{8} \\ -2\frac{3}{16} \\ \hline \end{array}$

6. $\begin{array}{r} \$3.27 \\ \times 68 \\ \hline \end{array}$ **7.** $\begin{array}{r} \$60.00 \\ -58.34 \\ \hline \end{array}$ **8.** $84\overline{)517}$ **9.** $\begin{array}{r} 754 \\ \times 468 \\ \hline \end{array}$ **10.** $\begin{array}{r} 7\frac{2}{5} \\ +4\frac{3}{10} \\ \hline \end{array}$

11. Add $\frac{7}{12}$ to $5\frac{3}{4}$.
12. Take $\frac{7}{8}$ from $2\frac{3}{16}$.
13. Multiply 905 by 307.
14. Divide $59.86 by 73.
15. $4\frac{2}{3}$ plus $3\frac{1}{2}$ plus $1\frac{5}{6}$ = ?
16. Divide $3.00 by 75.
17. $7\frac{5}{6} + 2\frac{1}{2} + 1\frac{7}{12} = ?$
18. Divide $57.40 by 82.
19. $10\frac{3}{8}$ minus $7\frac{9}{16}$ = ?
20. Divide 3,465 by 63.

6


PRICES
CAKES
CHOCOLATE — $1.25
COCONUT — $1.19
SPICE — 98¢
PIES
APPLE — 75¢
CHERRY — 79¢
BERRY — 82¢
COOKIES
VANILLA — 60¢ a pound
GINGER — 40¢ a pound
LEMON — 54¢ a pound
NUT — 48¢ a pound
ROLLS
SWEET — 70¢ a dozen
PLAIN — 48¢ a dozen
PECAN — 7¢ each

Selling at the School Fair

Using a price list in problem-solving [W]

1. The 5th-grade class had charge of the baked-goods booth at their school fair. Tom and Fred decorated the booth. They used $2\frac{3}{4}$ yd. of plastic material on each of two sides and $3\frac{1}{2}$ yd. on the third side. How many yards of material did they use?

2. At 70¢ a yard, how much did the plastic material cost?

3. When Lucy was the clerk, she sold a chocolate cake and $\frac{1}{2}$ doz. sweet rolls. How much did she charge for these things?

4. A customer asked Patty for $\frac{3}{4}$ lb. of vanilla cookies. How many ounces did Patty weigh out? How much did $\frac{3}{4}$ lb. cost?

5. Tom asked for 30¢ worth of ginger cookies and an apple pie. How much did he have to pay?

6. Lucy sold a cherry pie and 1 doz. plain rolls. What change did she give from a $5 bill?

7. Jim had $1.00 to spend. Could he buy an apple pie and $\frac{1}{2}$ doz. sweet rolls?

8. Lucy worked at the booth from 6:45 to 7:25, or _?_ min.

9. Find the total in the cash box when there were three $5 bills, eight $1 bills, 7 quarters, 3 dimes and 4 nickels.

10. Walter paid $1.17 for a berry pie and some pecan rolls. How many rolls did he buy?

Find the amount of change from each of these sales:

THINGS BOUGHT	AMOUNT USED TO PAY
11. Cherry pie and 1 doz. sweet rolls	$2.00
12. Coconut cake and 2 lb. ginger cookies	$5.00
13. Cherry pie and $\frac{1}{2}$ doz. plain rolls	$2.00
14. Spice cake, berry pie and $\frac{1}{2}$ lb. nut cookies	$5.00

15. Write and work 3 more problems using the picture.

Travel Problems

Multiplicand-multiplier-product relationship [O]

1. On a train trip from Toronto to Denver, Mary Lou had to change trains in Chicago. She arrived in Chicago at 11:30 A.M. and at 1:45 P.M. left for Denver. How long did she wait in Chicago?

2. Mary Lou's train was due in Denver at 4:50 P.M., but it did not arrive until 5:18 P.M. How many minutes late was the train?

3. Mary Lou's father met her. He arrived at the station 15 minutes before the train was due. At what time did he arrive? How long did he have to wait until Mary Lou's train arrived?

4. When it was 5:24 by Mary Lou's watch, her watch was 6 min. slow. What was the correct time?

5. A car moving at an average rate of 42 mi. an hour can go how far in 6 hr.? Rate × time = distance $42 \times 6 = n$

6. If a train is allowed 7 hr. to cover 301 mi., what must be its average rate per hour? $n \times 7 = 301$

7. How many hours will it take a bus going at an average rate of 35 mi. an hour to cover 175 mi.? $35 \times n = 175$

8. Make up four problems using the facts in this table.

	Time in hours	Average rate in miles an hour	Distance in miles
Bus	10	38	_?_
Auto	_?_	40	200
Boat	5	_?_	100
Train	_?_	45	135
Plane	3	250	_?_

9. Tell how to find the missing numbers in the table. Then on the board do the work to find the missing numbers.

Finding n, the Missing Dividend

Practice in M. [W]

In Ex. 1a, below, we know the divisor and the quotient. To find *n*, the missing dividend, we can *think*, "We have two factors and must find the product." We write the example as in the box.

$$\boxed{\begin{array}{r} 70 \\ \underline{\times 96} \end{array}}$$

Do the work to find *n*, the missing dividend, in rows 1 and 2.

	a	b	c	d
1.	$n \div 70 = 96$	$n \div 46 = 80$	$n \div 87 = 56$	$n \div 349 = 672$
2.	$n \div 30 = 87$	$n \div 95 = 90$	$n \div 69 = 84$	$n \div 896 = 402$

In rows 3 and 4, first estimate the value of *n* by rounding the quotient to the nearest hundred or thousand. On your paper write your estimate. Then find the exact value for *n*.

3.	$n \div 6 = 798$	$n \div 20 = 302$	$n \div 8 = 6{,}954$	$n \div 9 = 5{,}016$
4.	$n \div 9 = 586$	$n \div 30 = 199$	$n \div 5 = 3{,}874$	$n \div 7 = 7{,}998$

To Bring You Up to Date in Division

Readiness for non-apparent quotients [W]

Copy, work, and check these division examples. You should understand all these before you go on to new work.

	a	b	c	d	e
1.	$60\overline{)480}$	$90\overline{)720}$	$50\overline{)490}$	$70\overline{)640}$	$80\overline{)580}$
2.	$23\overline{)69}$	$42\overline{)88}$	$71\overline{)355}$	$92\overline{)289}$	$84\overline{)179}$
3.	$42\overline{)92}$	$81\overline{)680}$	$95\overline{)387}$	$98\overline{)240}$	$84\overline{)781}$
4.	$32\overline{)992}$	$43\overline{)489}$	$73\overline{)1{,}679}$	$41\overline{)1{,}784}$	$82\overline{)1{,}888}$
5.	$21\overline{)903}$	$45\overline{)541}$	$82\overline{)4{,}281}$	$75\overline{)\$32.30}$	$86\overline{)\$46.44}$
6.	$76\overline{)\$6.08}$	$24\overline{)725}$	$57\overline{)\$22.80}$	$68\overline{)2{,}049}$	$69\overline{)2{,}797}$

Testing the Trial Quotient Figure

Non-apparent 1-figure quotients [O]

In your work with 2-place divisors, the estimated quotient figure has always been the correct quotient figure. Now you will have division in which you will often have to make two or more estimates (or trials) to find the correct (or true) quotient figure. The work in boxes A–C and in Ex. 1 explains this new step.

A	**B**	**C**
$45\overline{)375}$	Do these steps mentally or on paper: $\begin{array}{r} 9+ \\ 40\overline{)370} \end{array}$ $\quad \begin{array}{r} 45 \\ \times 9 \\ \hline 405 \end{array}$ $\quad \begin{array}{r} 45 \\ \times 8 \\ \hline 360 \end{array}$	Write this: $\begin{array}{rl} 8, \text{ R}15 & \\ 45\overline{)37\overset{\times}{5}} & \\ 360 & (8 \times 45) \\ \hline 15 & \end{array}$

1. In box A, are there enough hundreds (3) to divide among 45 groups? enough tens (37)? No, so we divide 375 ones.

Estimate the quotient: 40's in 370, or 4's in 37 = ? But we cannot be sure that there are nine 45's in 375 until we have multiplied, as in box B.

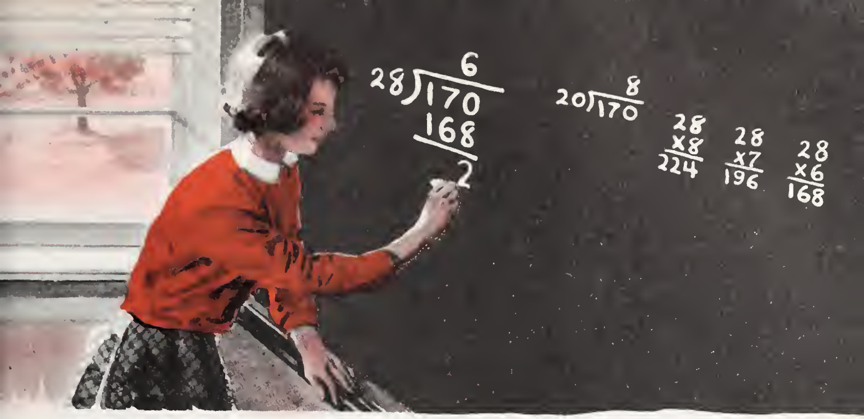
Multiply and compare: 9 × 45 = 405. 405 is more than 375, so 9 is *not* the correct quotient figure.

Try 8, *the next smaller number.* 8 × 45 = ? Since 360 is less than 375, we write "8" for the quotient figure (box C).

In 375 there are _?_ 45's with a remainder of _?_.

2. To work the example in box D, we divide as in box F. Use the helping steps in box E to explain the division in box F.

D	**E**	**F**
$48\overline{)332}$	Think or write these steps: $\begin{array}{r} 8+ \\ 40\overline{)330} \end{array}$ $\quad \begin{array}{r} 48 \\ \times 8 \\ \hline 384 \end{array}$ $\quad \begin{array}{r} 48 \\ \times 7 \\ \hline 336 \end{array}$ $\quad \begin{array}{r} 48 \\ \times 6 \\ \hline 288 \end{array}$	Write this: $\begin{array}{rl} 6, \text{ R}44 & \\ 48\overline{)33\overset{\times}{2}} & \\ 288 & (6 \times 48) \\ \hline 44 & \end{array}$



3. "The 28 children in our club have colored 170 Easter eggs," said Marie. "We'll share them equally. I'll divide to see what each child's share is."

Division is hard for Marie, so she uses side work. She writes each step for finding the correct, or true, quotient figure.

What was Marie's first estimated quotient? If Marie had noticed that eight 20's = 160, could she have been quite sure that eight 28's would be more than 170? Why?

What number did Marie try for her second estimate?

Why did Marie have to use 6 for the true, or correct, quotient?

Each child can have _?_ eggs. _?_ eggs will be left over.

[W]

Divide and check. Test each quotient figure before you write it by multiplying mentally or in side work.

	a	b	c	d	e	f
4.	85)493	26)194	63)490	24)190	64)592	65)563
5.	44)370	38)253	74)570	28)111	45)342	55)420
6.	85)582	49)372	93)773	58)402	83)653	74)683
7.	24)192	37)250	35)291	39)283	94)702	54)416

➤ **Extra Practice.** Work Set 73.

Multiplying Mentally and Comparing

Estimating [O]

This page will help you learn to test trial quotients mentally.

Tell which number is larger — the product of the factors in column a or the number in column b. Tell how you know.

For Ex. 1a below, look at the 4 tens in 46 and *think*,

"8 × 4 tens = 32 tens, or 320."

Compare 320 with 330 in column b. The difference is 10.

Think, "8 × 6 (ones) is more than 10, so the product in a is larger."

	a	b		a	b
1.	8 × 46	330	9.	6 × 47	251
2.	7 × 56	368	10.	8 × 93	790
3.	6 × 84	550	11.	7 × 42	298
4.	4 × 92	398	12.	4 × 98	420
5.	5 × 86	410	13.	9 × 56	465
6.	6 × 37	240	14.	6 × 67	360
7.	9 × 45	362	15.	3 × 96	279
8.	3 × 88	286	16.	6 × 94	597

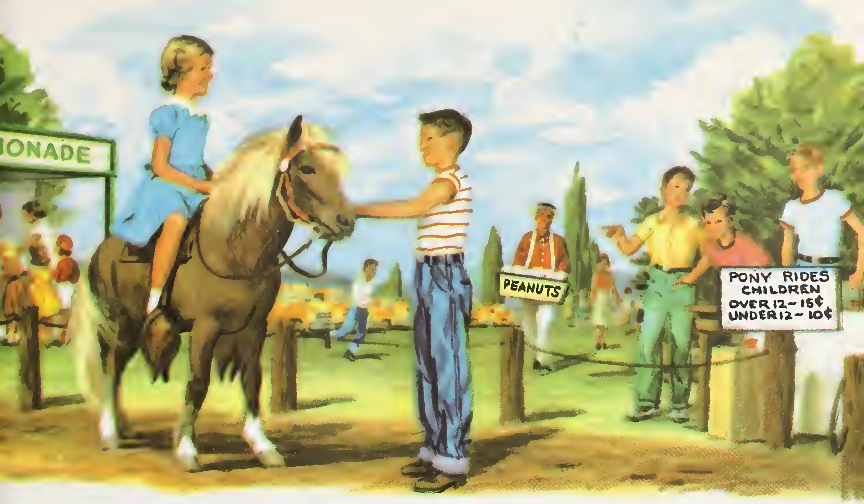
Practice in Finding 1-Place Quotients

Apparent and non-apparent quotients [W]

Divide and check. Try to multiply mentally to test each trial quotient figure.

	a	b	c	d	e	f
1.	94)599	47)258	56)370	96)276	37)246	67)365
2.	56)468	98)427	84)552	92)399	45)367	29)148
3.	42)296	86)418	46)339	93)796	88)289	27)196

▶ **Extra Practice.** Work Set 74.



Fun at the Church Picnic

Problem-solving; using information in a picture [W]

1. Jack is 13 yr. old; Don and Ned are 11 yr. old. How much would pony rides for the 3 children cost?

2. During the day, 37 children over 12 and 85 children under 12 bought tickets for pony rides. How much money did the ticket seller take in?

3. Fred bought 3 bags of popcorn at 10¢ a bag. How much money had Fred given the man if he received a half dollar and 2 dimes in change?

4. The man with the peanuts sold 30 lb. in 10-ounce bags. How many bags did he sell?

5. Thirty-two children ran in one relay race and half as many children ran in another one. How many ran in both races?

6. "Guess how many people came in the buses," said Dot. "I'll say 300," said Nan. "I'll guess 340," said Jack. "You're both wrong," said Dot. "My father ordered buses for 270 people." How far off was Nan? Jack?

7. With 30 people to a bus, how many buses were needed?

Finding 2-Place Quotients

2 non-apparent quotient figures [O]

1. Jim's father drove his car 4,230 miles in 54 days. This was an average of how many miles a day?

Study boxes A to C below only if you need help.

A	B	C
Locate the quotient figures: $\begin{array}{r} \text{xx} \\ 54\overline{)4{,}230} \end{array}$	Write this: $\begin{array}{rl} 78, \text{R}18 & \\ \text{xx} & \\ 54\overline{)4{,}230} & \\ \underline{3\ 78} & (7 \text{ tens} \times 54) \\ 450 & \\ \underline{432} & (8 \times 54) \\ 18 & \end{array}$	Try to think this side work: *First partial dividend* $\begin{array}{r} 8+ \\ 50\overline{)420} \end{array}$ (tens) $\quad \begin{array}{r} 54 \\ \underline{\times 8} \\ 432 \end{array} \quad \begin{array}{r} 54 \\ \underline{\times 7} \\ 378 \end{array}$ *Second partial dividend* $\begin{array}{r} 9+ \\ 50\overline{)450} \end{array}$ (ones) $\quad \begin{array}{r} 54 \\ \underline{\times 9} \\ 486 \end{array}$

In box A, are there enough thousands (4) to divide among 54 groups? enough hundreds (42)? enough tens (423)? Yes, so 423 tens is the **first partial dividend.** Then we must find a ten's figure and a one's figure for the quotient.

How do we estimate the ten's figure (box C)? How do we test it? In box B, why do we write "7" and not "8" for the ten's quotient figure?

What is the **second partial dividend** (box B)? Why is 8 and not 9 the one's quotient figure (box C)?

Jim's father averaged more than _?_ miles a day. We call it more than 78 because there is a remainder.

Tell which quotient figures below are too large. Explain.

	a	b	c	d	e
2.	$\begin{array}{r} 8 \\ 69\overline{)5{,}070} \end{array}$	$\begin{array}{r} 4 \\ 92\overline{)3{,}950} \end{array}$	$\begin{array}{r} 7 \\ 87\overline{)5{,}836} \end{array}$	$\begin{array}{r} 8 \\ 74\overline{)5{,}778} \end{array}$	$\begin{array}{r} 5 \\ 56\overline{)2{,}878} \end{array}$
3.	$\begin{array}{r} 3 \\ 72\overline{)2{,}584} \end{array}$	$\begin{array}{r} 7 \\ 63\overline{)4{,}327} \end{array}$	$\begin{array}{r} 5 \\ 25\overline{)1{,}125} \end{array}$	$\begin{array}{r} 5 \\ 97\overline{)4{,}947} \end{array}$	$\begin{array}{r} 9 \\ 68\overline{)5{,}644} \end{array}$

4. The boxes below show how an example might look if you use side work. Explain the division and the check.

5. Tell how the side work multiplications for testing the first quotient figure often help in finding the second quotient figure.

If you cannot test quotients mentally, it is better to write your multiplications neatly beside your division than to multiply on another piece of paper. Side work makes it easier for you to find any errors you may have made.

	Side Work	Check
76, R58 78)5,986 5 46 (7 tens × 78) 526 468 (6 × 78) 58	*First partial dividend* 8+ 78 78 70)590 (tens) ×8 ×7 624 546 *Second partial dividend* 7+ 78 70)520 (ones) ×6 468	78 ×76 468 546 5,928 +58 5,986

[W]

Divide and check in rows 6 to 10. Test each quotient figure before you write it. Multiply mentally or use side work.

	a	b	c	d	e
6.	94)3,281	35)2,967	63)4,914	35)2,360	63)$59.22
7.	74)4,982	54)4,482	75)6,543	64)4,978	72)$45.13
8.	55)3,732	34)2,230	74)5,772	84)5,361	93)$76.03
9.	85)6,330	65)4,922	44)3,700	93)6;402	55)$45.98
10.	54)4,699	84)6,525	24)1,732	35)2,962	53)$44.82

➤ **Extra Practice.** Work Set 75.

Can You Find the Mistakes?

Apparent and non-apparent quotient figures [W]

There are mistakes in some of the following examples. Find the incorrect examples. Then copy and work them correctly.

	a	b	c	d
1.	$\begin{array}{r} 52,\ \text{R}24 \\ 38\overline{)2{,}000} \\ \underline{1\,90} \\ 100 \\ \underline{76} \\ 24 \end{array}$	$\begin{array}{r} 64,\ \text{R}4 \\ 47\overline{)3{,}004} \\ \underline{2\,82} \\ 184 \\ \underline{188} \\ 4 \end{array}$	$\begin{array}{r} 72,\ \text{R}6 \\ 79\overline{)5{,}684} \\ \underline{5\,53} \\ 154 \\ \underline{148} \\ 6 \end{array}$	$\begin{array}{r} 78,\ \text{R}75 \\ 83\overline{)6{,}549} \\ \underline{5\,81} \\ 739 \\ \underline{664} \\ 75 \end{array}$
2.	$\begin{array}{r} 51,\ \text{R}25 \\ 35\overline{)1{,}900} \\ \underline{1\,75} \\ 50 \\ \underline{35} \\ 25 \end{array}$	$\begin{array}{r} 78 \\ 96\overline{)7{,}488} \\ \underline{6\,72} \\ 768 \\ \underline{768} \end{array}$	$\begin{array}{r} 84,\ \text{R}8 \\ 86\overline{)6{,}532} \\ \underline{6\,88} \\ 352 \\ \underline{344} \\ 8 \end{array}$	$\begin{array}{r} \$0.31,\ \text{R}63 \\ 62\overline{)\$19.85} \\ \underline{18\,6} \\ 1\,25 \\ \underline{62} \\ 63 \end{array}$

Division Practice

Apparent and non-apparent quotient figures [W]

As you divide, try to multiply mentally to find out whether your estimated quotient figures are correct. If you can't do this, use side work. *Do all your work on the same paper.*

	a	b	c	d	e	f
1.	$49\overline{)2{,}206}$	$56\overline{)2{,}637}$	$53\overline{)4{,}009}$	$59\overline{)3{,}418}$	$47\overline{)2{,}116}$	$38\overline{)1{,}385}$
2.	$67\overline{)3{,}824}$	$39\overline{)1{,}746}$	$46\overline{)3{,}518}$	$87\overline{)7{,}453}$	$73\overline{)5{,}000}$	$37\overline{)1{,}764}$
3.	$48\overline{)3{,}140}$	$43\overline{)3{,}012}$	$57\overline{)4{,}319}$	$62\overline{)4{,}587}$	$67\overline{)4{,}459}$	$48\overline{)1{,}812}$
4.	$47\overline{)3{,}682}$	$87\overline{)6{,}544}$	$69\overline{)4{,}598}$	$89\overline{)5{,}649}$	$25\overline{)1{,}948}$	$36\overline{)2{,}403}$

Extra Practice. Work Sets 76 and 77.

Can You Tell What Process to Use?

Problems with missing numbers [O]

Answer the questions below. Then put in numbers and make a problem for each of Ex. 1 to 4.

1. You know Tom's weight and Bob's weight. How do you find how much less one boy weighs than the other?

2. Jean knows the price for each of five different puppets. How can she find the total cost of the five puppets?

3. Ann knows the cost of 20 yd. of material. How can she find the cost of 1 yd.?

4. Jim knows how many papers he delivers a day. How can he find out how many he delivers in 6 days?

Using 2-Place Multipliers and Divisors

Differentiating between processes [W]

1. Susan's class spent $8.96 for material for puppets. If each of the 32 children in the class made a puppet and all the material was used, what was the average cost of a puppet?

2. Tom's school bought 18 records at 85¢ each. What was the total cost?

3. If Jim saves 15¢ of his allowance a week, how much does he save in 20 weeks?

4. Jim gets an allowance of 35¢ a week. How much can he spend in the 20 weeks? (See Ex. 3.)

5. Jim's brother bought a typewriter for $27.00 and paid for it in 36 equal weekly payments. How much did he pay a week?

6. If a class uses 40 drinking straws a day, how many days will a box of 1,000 straws last?

7. At $1.35 each, what is the cost of 28 music books?

8. Tom delivers 65 papers per day. How many papers does he deliver in 31 delivery days?

Answer Please! No Pencils!

Review of measures; mental M. and D. [O]

Use facts in the tables of measures for these:

	a	b	c
1.	3 pt. = _?_ cups	12 ft. = _?_ yd.	$\frac{1}{3}$ ft. = _?_ in.
2.	4 wk. = _?_ days	24 qt. = _?_ gal.	$\frac{1}{2}$ lb. = _?_ oz.
3.	8 gal. = _?_ qt.	10 cups = _?_ pt.	$\frac{1}{2}$ gal. = _?_ qt.
4.	5 bu. = _?_ pk.	30 pt. = _?_ qt.	$\frac{1}{2}$ hr. = _?_ min.
5.	2 da. = _?_ hr.	12 pk. = _?_ bu.	$\frac{1}{4}$ yd. = _?_ in.
6.	3 hr. = _?_ min.	35 days = _?_ wk.	$\frac{3}{4}$ lb. = _?_ oz.
7.	2 min. = _?_ sec.	72 in. = _?_ yd.	$\frac{1}{2}$ yd. = _?_ in.
8.	4 yd. = _?_ ft.	120 sec. = _?_ min.	$\frac{3}{4}$ hr. = _?_ min.

Did you multiply or divide for each example in column a? What did you do for each example in column b? in c?

How Well Can You Follow Directions?

Cumulative review; A., S., M., D. [W]

Estimate each answer first. Use your estimate to help you decide whether your exact answer is sensible.

1. Multiply $43.59 by 9.
2. Subtract $65.98 from $80.15.
3. Divide $63.81 by 9.
4. Add $47.39 to $2.84.
5. Take $2\frac{5}{8}$ from $3\frac{7}{8}$.
6. Multiply $0.90 by 80.
7. Find $\frac{1}{8}$ of 6,252.
8. $30 minus $6.87 = ?
9. Divide 3,174 by 93.
10. Find $\frac{3}{4}$ of 816.
11. Multiply 75 by 84.
12. Add $5\frac{1}{6}$ to $4\frac{5}{12}$.
13. Divide 957 by 32.
14. Add $7\frac{9}{10}$ to $4\frac{3}{5}$.
15. Divide $50.32 by 68.
16. Subtract $\frac{5}{8}$ from $2\frac{3}{4}$.
17. 57 times 892 = ?
18. Take $2\frac{9}{16}$ from $6\frac{3}{8}$.
19. Divide 4,940 by 78.
20. Multiply $3.79 by 486.

Can a Trial Quotient Be Larger than 9?

[O]

1. Jim has saved 208 stamps. In his new album he can put 24 stamps on a page. How many pages can Jim fill? How many stamps will be left over to fill part of another page?

A	**B** Side work:
$24\overline{)208}$	$\begin{array}{r}10\\20\overline{)200}\end{array}\quad\begin{array}{r}24\\\times\ 9\\\hline 216\end{array}\quad\begin{array}{r}24\\\times\ 8\\\hline 192\end{array}$

If we estimate Ex. A in the usual way (box B), the quotient seems to be 10. Multiplying 24 by 10 gives _?_, a product that is too large so we know the quotient figure must be 9 or smaller.

We try 9 (box B). Is 9 the correct quotient figure? Is 8? On the board, finish Ex. A. What is the remainder?

Jim can fill _?_ pages. There will be _?_ stamps left.

For examples like Ex. A above, in which the trial quotient is 10 or larger, we use the rule given below.

Never use a trial quotient figure larger than 9.

Prove that the quotient figure in each example in row 2 is less than 10. Copy and finish these examples on the board:

	a	b	c	d	e	f
2.	$\begin{array}{r}34\overline{)317}\\\underline{306}\end{array}$	$\begin{array}{r}29\overline{)256}\\\underline{232}\end{array}$	$\begin{array}{r}68\overline{)615}\\\underline{612}\end{array}$	$\begin{array}{r}46\overline{)403}\\\underline{368}\end{array}$	$\begin{array}{r}58\overline{)513}\\\underline{464}\end{array}$	$\begin{array}{r}76\overline{)732}\\\underline{684}\end{array}$

[W]

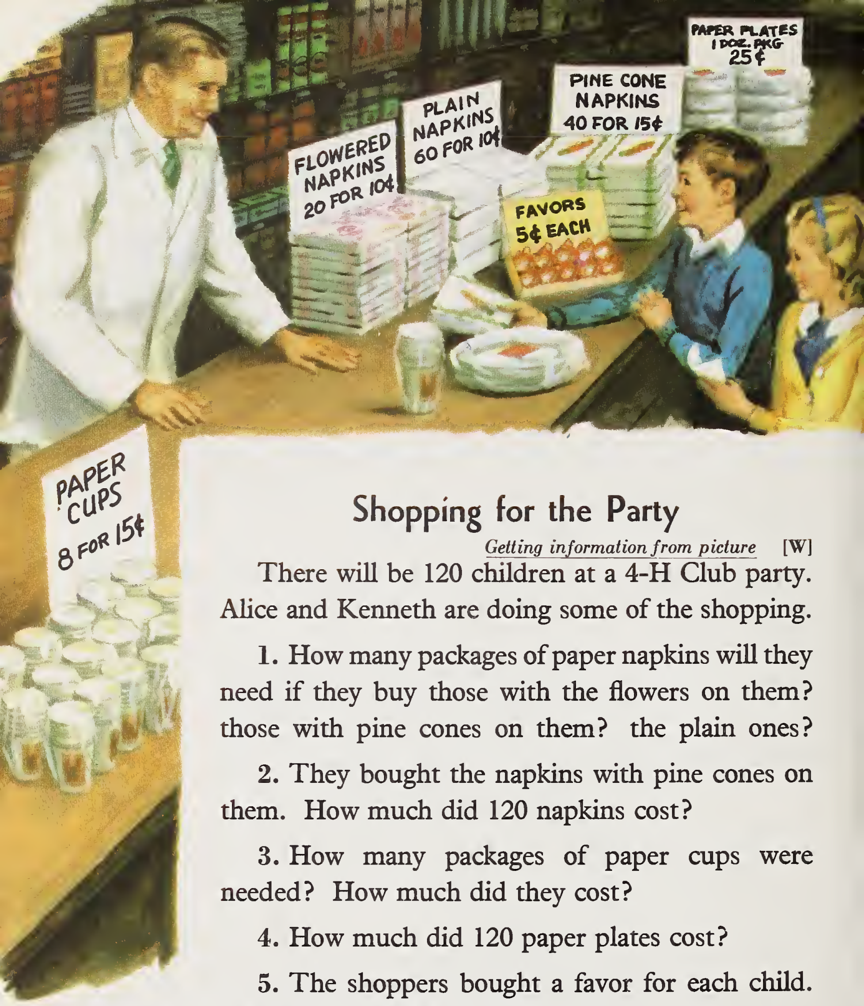
Divide and check. Test each quotient figure before you write it. Multiply mentally if you can. Use side work if you need to.

3. $23\overline{)204}$ $59\overline{)516}$ $28\overline{)195}$ $79\overline{)703}$ $85\overline{)492}$ $56\overline{)427}$

4. $28\overline{)817}$ $23\overline{)2{,}162}$ $37\overline{)3{,}656}$ $43\overline{)3{,}690}$ $89\overline{)8{,}007}$ $47\overline{)\$45.87}$

5. $67\overline{)6{,}098}$ $46\overline{)3{,}208}$ $35\overline{)2{,}403}$ $85\overline{)7{,}532}$ $27\overline{)2{,}590}$ $74\overline{)\$70.73}$

▶ **Extra Practice.** Work Sets 78 and 79.



Shopping for the Party

Getting information from picture [W]

There will be 120 children at a 4-H Club party. Alice and Kenneth are doing some of the shopping.

1. How many packages of paper napkins will they need if they buy those with the flowers on them? those with pine cones on them? the plain ones?

2. They bought the napkins with pine cones on them. How much did 120 napkins cost?

3. How many packages of paper cups were needed? How much did they cost?

4. How much did 120 paper plates cost?

5. The shoppers bought a favor for each child. How much did the favors cost?

6. Alice's mother ordered the ice cream. She planned to serve 24 children from 1 gallon. How many gallons did she order?

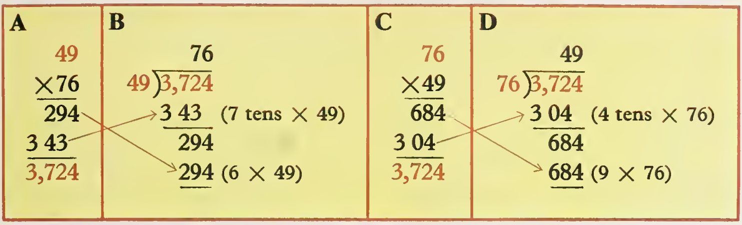
7. How much did the ice cream cost at $1.85 a gallon?

8. At $1.05 each, how much did 10 large cakes cost?

9. Find the total cost of the above things for the party.

Relating Multiplication and Division

Multiplicand-multiplier-product relationship; checking [O]



1. How was Ex. B made from Ex. A?

2. In Ex. B, we know the product (3,724) and one of the factors (49). What did we do to find the other factor?

3. Do you see that the parts which are subtracted in Ex. B are the same as the parts which are added (partial products) in Ex. A? Tell where you see the product for 6 × 49 in Ex. A; in Ex. B. Where do you see the product for 7 tens × 49 in Ex. A? in Ex. B?

4. Tell how Ex. C and D are related to Ex. A.

5. Explain how and why division can be used to check a multiplication example.

6. David says that multiplication and division are opposite processes. Do you agree? Why?

[W]

Find the products for Ex. 7 to 10. Then make and work one related multiplication example and two related division examples for each of Ex. 7 to 10, as in boxes A to D above.

7. 39 × 57 8. 46 × 28 9. 94 × 52 10. 65 × 38

Find the quotients for Ex. 11 to 14. Then make and work one related division example and two related multiplication examples for each of Ex. 11 to 14.

11. 86)2,752 12. 74)4,366 13. 92)3,220 14. 67)5,360

Teen Numbers as Divisors

Estimating the quotient figure [O]

1. A car averages 16 miles to a gallon of gasoline. How many gallons are needed for a trip of 80 miles?

With teen-number divisors, watch for new ways to estimate the quotient figure.

In Ex. A, tell why we shouldn't bother with 8 as an estimate.

Why can we skip 7 as an estimate?

$6 \times 16 = ?$ Even 6 is too large, so try 5. Why is 5 correct?

A trip of 80 miles takes _?_ gal.

A

$16\overline{)80}$

Think this:

$6 \times 16 = ?$

$5 \times 16 = ?$

B

$$\begin{array}{r} 75 \\ 16\overline{)1{,}200} \end{array}$$

Check

$$\begin{array}{r} 16 \\ \times\ 75 \\ \hline \end{array}$$

2. The car in Ex. 1 would use how many gallons of gasoline for a trip of 1,200 miles?

On the board, finish the division in box B and the check.

A trip of 1,200 miles would take _?_ gallons.

Tell which quotient figures in row 3 are not correct.

Work all the examples on the board correctly.

	a	b	c	d	e
3.	$\begin{array}{r} 7 \\ 14\overline{)87} \end{array}$	$\begin{array}{r} 9 \\ 19\overline{)145} \end{array}$	$\begin{array}{r} 8 \\ 14\overline{)120} \end{array}$	$\begin{array}{r} 7 \\ 18\overline{)140} \end{array}$	$\begin{array}{r} 7 \\ 17\overline{)143} \end{array}$

[W]

Find quotients and remainders for the following. Before you write each quotient figure, test it by multiplying mentally or in side work. When the estimated quotient is 10, try 9.

4.	$12\overline{)958}$	$18\overline{)1{,}073}$	$69\overline{)4{,}999}$	$16\overline{)1{,}397}$	$83\overline{)6{,}474}$
5.	$17\overline{)807}$	$15\overline{)1{,}485}$	$36\overline{)3{,}178}$	$18\overline{)1{,}573}$	$65\overline{)4{,}365}$
6.	$14\overline{)900}$	$19\overline{)1{,}899}$	$74\overline{)7{,}008}$	$17\overline{)1{,}600}$	$46\overline{)3{,}527}$
7.	$16\overline{)896}$	$13\overline{)845}$	$53\overline{)5{,}127}$	$15\overline{)1{,}137}$	$46\overline{)3{,}128}$

➤ **Extra Practice.** Work Set 80.

Placing Quotient Figures Correctly

1- to 3-place quotients [O]

Tell which quotient figures are incorrectly placed and why.

	a	b	c	d	e	f
1.	$\begin{array}{r}1\\24\overline{)36}\end{array}$	$\begin{array}{r}5\\24\overline{)124}\end{array}$	$\begin{array}{r}37\\24\overline{)897}\end{array}$	$\begin{array}{r}69\\24\overline{)1{,}675}\end{array}$	$\begin{array}{r}294\\24\overline{)7{,}056}\end{array}$	$\begin{array}{r}45\ 7\\24\overline{)10{,}968}\end{array}$
2.	$\begin{array}{r}46\\7\overline{)326}\end{array}$	$\begin{array}{r}138\\7\overline{)966}\end{array}$	$\begin{array}{r}546\\6\overline{)3{,}276}\end{array}$	$\begin{array}{r}1{,}366\\6\overline{)8{,}196}\end{array}$	$\begin{array}{r}4{,}16\\9\overline{)3{,}744}\end{array}$	$\begin{array}{r}1{,}040\\8\overline{)8{,}320}\end{array}$
3.	$\begin{array}{r}2\\23\overline{)50}\end{array}$	$\begin{array}{r}1\\79\overline{)92}\end{array}$	$\begin{array}{r}15\\32\overline{)489}\end{array}$	$\begin{array}{r}83\\45\overline{)3{,}735}\end{array}$	$\begin{array}{r}64\\27\overline{)1{,}728}\end{array}$	$\begin{array}{r}15\\62\overline{)930}\end{array}$

[W]

Copy and finish correctly the examples in rows 1 to 3 above.

Finding 3-Place Quotients

Some non-apparent quotient figures [O]

1. Could you work Ex. 1e and 1f above? How are they like the example in the box at the right?

2. How can we tell when an example will have a 3-place quotient?

3. Which examples in row 4 below will have 3-place quotients? Why?

$$\begin{array}{r} 326,\ \text{R}3 \\ 27\overline{)8{,}805} \\ \underline{8\,1} \\ 70 \\ \underline{54} \\ 165 \\ \underline{162} \\ 3 \end{array}$$

Check

$$\begin{array}{r} 326 \\ \underline{\times\ 27} \\ 2{,}282 \\ \underline{6\,52} \\ 8{,}802 \\ \underline{+\ 3} \\ 8{,}805 \end{array}$$

[W]

Copy, divide, and check each example in rows 4 to 6.

	a	b	c	d	e
4.	$24\overline{)9{,}975}$	$96\overline{)3{,}744}$	$54\overline{)8{,}056}$	$75\overline{)5{,}801}$	$46\overline{)\$98.75}$
5.	$29\overline{)8{,}010}$	$36\overline{)1{,}980}$	$78\overline{)3{,}682}$	$96\overline{)758}$	$56\overline{)\$91.74}$
6.	$89\overline{)801}$	$39\overline{)9{,}399}$	$87\overline{)450}$	$84\overline{)2{,}759}$	$58\overline{)\$39.25}$

➤ **Extra Practice.** Work Set 85.

More 3-Place Quotients

Some non-apparent quotient figures **[O]**

On the board, copy the examples in row 1 without the work. Then divide and explain each step. Compare your work with that in the book.

	a	b	c	d
	524, R28	542	$1.21	$5.37, R12¢
1.	93)48,760	74)40,108	86)$104.06	59)$316.95
	46 5	37 0	86	295
	2 26	3 10	18 0	21 9
	1 86	2 96	17 2	17 7
	400	148	86	4 25
	372	148	86	4 13
	28			12

For rows 2 and 3, tell what the first partial dividend is, where the first quotient figure will be written, and how many figures there will be in each quotient.

After the first quotient figure is placed, we write a quotient figure for each dividend figure we bring down.

[W]

Copy, divide, and check.

	a	b	c	d	e
2.	95)60,372	76)359	53)23,970	46)270	78)$420.42
3.	35)989	23)8,965	92)31,883	34)9,758	43)$9.70
4.	65)28,145	36)1,854	85)61,710	73)5,996	48)$368.31
5.	73)13,524	98)483	76)32,102	29)204	38)$179.05
6.	44)31,836	47)2,567	87)13,450	75)308	45)$202.67
7.	92)48,032	38)7,209	69)37,598	49)2,867	36)$83.88

➤ **Extra Practice.** Work Set 88.

Middle Quotient Figure a Zero

[O]

1. Six classes in the Barton School collected 2,430 lb. of old paper. Find the average per class.

Explain Ex. A. Tell why 0 is the ten's quotient figure. What was the average for a class?

A

$$\begin{array}{r} 405 \\ 6\overline{)2,430} \\ \underline{2\,4\downarrow\downarrow} \\ 30 \\ \underline{30} \end{array}$$

2. In Ames School, 31 classes collected 18,895 pounds of paper. What was the average per class?

In box B, what is the first partial dividend? the second partial dividend?

Can 29 (tens) be divided among 31 groups? What is the ten's quotient figure?

We bring down the 5 (ones) and then have _?_ ones for the third partial dividend. Why is 9 the one's quotient figure?

B

$$\begin{array}{r} 609,\ \text{R}16 \\ 31\overline{)18,895} \\ \underline{18\,6\downarrow\downarrow} \\ 295 \\ \underline{279} \\ 16 \end{array}$$

The average was more than 609 lb. but less than 610 lb. Why?

Tell why we need 0 in each of the quotients in row 3.

	a	b	c	d
3.	$\begin{array}{r} 508,\ \text{R}14 \\ 43\overline{)21,858} \\ \underline{21\,5\downarrow\downarrow} \\ 358 \\ \underline{344} \\ 14 \end{array}$	$\begin{array}{r} \$3.40 \\ 96\overline{)\$326.40} \\ \underline{288\downarrow} \\ 38\,4 \\ \underline{38\,4\downarrow} \\ 0 \end{array}$	$\begin{array}{r} 807,\ \text{R}13 \\ 92\overline{)74,257} \\ \underline{73\,6\downarrow\downarrow} \\ 6\,57 \\ \underline{6\,44} \\ 13 \end{array}$	$\begin{array}{r} 730,\ \text{R}7 \\ 54\overline{)39,427} \\ \underline{37\,8\downarrow} \\ 1\,62 \\ \underline{1\,62\downarrow} \\ 7 \end{array}$

[W]

Copy, divide and check.

	a	b	c	d	e
4.	$56\overline{)\$73.92}$	$45\overline{)23,850}$	$92\overline{)\$599.08}$	$65\overline{)28,145}$	$34\overline{)\$3,608}$
5.	$37\overline{)\$85.10}$	$62\overline{)56,429}$	$73\overline{)\$152.57}$	$83\overline{)55,664}$	$77\overline{)\$6,160}$
6.	$63\overline{)\$72.69}$	$95\overline{)78,300}$	$82\overline{)\$426.40}$	$87\overline{)35,094}$	$75\overline{)30,450}$

➤ **Extra Practice.** Work Set 89.

Two Zeros in a 3-Place Quotient

[O]

1. In the boxed example, what is the first partial dividend?

$$\begin{array}{r} 600, \text{ R19} \\ 57\overline{)34{,}219} \\ \underline{34\,2\downarrow\downarrow} \\ 19 \end{array}$$

Explain why 6 is the hundred's quotient figure. 6 (hundreds) × 57 = ?

342 − 342 = ? Bring down the 1 in ten's place for the second partial dividend. Why do we write 0 as the ten's quotient figure?

Next we bring down the 9 in one's place to make 19 ones for the third partial dividend. Can 19 be divided by 57? No, so we write "0" as the one's quotient figure.

The quotient is _?_, and there is a remainder of _?_.

Work the examples in row 2 on the board to find out whether the given quotients are correct.

	a	b	c	d
	400, R9	\$7.00	700, R35	\$7.03, R27¢
2.	84)33,609	42)\$294.00	63)44,135	64)\$450.19

After the first quotient figure is placed, we must write a quotient figure for each dividend figure we bring down. Sometimes a quotient figure is zero.

[W]

Copy, divide, and check. Use side work when you need it.

3. 80)48,005   67)27,189   96)\$336.04   93)\$97.65

4. 54)37,852   84)25,208   39)\$276.13   75)\$30.09

5. 76)45,644   65)30,610   56)\$395.00   38)\$28.50

6. 34)29,247   46)27,630   27)13,501   87)\$352.34

▶ **Extra Practice.** Work Set 92.

Which Estimate Is Closest?

Estimating in M. and D. [O]

Tell which of the numbers given after each problem below is the best estimate and why.

1. Fred's school paid $46.44 for 36 music books. What was the cost of one? $0.95 $1.25 $2.00

2. What is the cost of 250 readers at $1.27 each? $300 $500 $600

3. Tom saved $58.44 in a year. What was the average amount he saved a month? $4.00 $5.00 $6.00

4. A farmer paid $146.25 for 75 new apple trees. How much was this per tree? $2.00 $1.00 $0.50

5. There were 297 people at the church dinner. The tickets cost $1.50 per person. What was the total amount collected for the dinner? $200 $300 $450

[W]

Now, for each of problems 1 to 5, find the exact answer and compare it with your estimate.

Finding Mistakes by Checking

[W]

Multiply the quotient and the divisor and add any remainder. Find incorrect answers and work those examples correctly.

	a	b	c	d
1.	$\begin{array}{r}472\\27\overline{)12,771}\end{array}$	$\begin{array}{r}87\\96\overline{)8,352}\end{array}$	$\begin{array}{r}609,\text{ R8}\\15\overline{)9,135}\end{array}$	$\begin{array}{r}470\\86\overline{)49,020}\end{array}$
2.	$\begin{array}{r}396\\54\overline{)21,384}\end{array}$	$\begin{array}{r}58\\67\overline{)38,860}\end{array}$	$\begin{array}{r}89\\73\overline{)59,057}\end{array}$	$\begin{array}{r}94\\39\overline{)3,666}\end{array}$
3.	$\begin{array}{r}74\\98\overline{)7,282}\end{array}$	$\begin{array}{r}403\\80\overline{)34,400}\end{array}$	$\begin{array}{r}500,\text{ R16}\\29\overline{)14,516}\end{array}$	$\begin{array}{r}51\\48\overline{)2,421}\end{array}$

➤ **Extra Practice.** Work Set 93.

Showing the Remainder in a Fraction

Dividing the remainder [O]

1. Four children had these things to share equally at a party: 5 apples, 7 slices of jelly roll, and 10 sandwiches.

Make paper cut-outs to show how the children could share equally.

A

$1\frac{1}{4}$ apples
$4\overline{)5}$ apples
4
1 apple ÷ 4 = $\frac{1}{4}$

2. Ann said, "I'll give each of us 1 whole apple. Then I'll cut the other one into fourths and we can each have $\frac{1}{4}$ of it. Each of us gets _?_ apples."

How does the work in box A show what Ann did?

B

$1\frac{3}{4}$ slices
$4\overline{)7}$ slices
4
3 slices ÷ 4 = $\frac{3}{4}$

3. Bill said, "Seven slices of jelly roll are enough so we can each have 1 whole slice and there will be 3 slices left to divide. They can be divided to give each of us another $\frac{3}{4}$ slice."

Each child's share is _?_ slices of jelly roll (box B).

C

$2\frac{1}{2}$ sandwiches
$4\overline{)10}$ sandwiches
8
2 left ÷ 4 = $\frac{2}{4}$, or $\frac{1}{2}$

4. Mary said, "I'll give each of us 2 sandwiches. That takes 8. The remainder, 2 sandwiches, can be divided to give each of us another $\frac{1}{2}$ sandwich."

Each child's share of the sandwiches will be _?_ (box C).

D

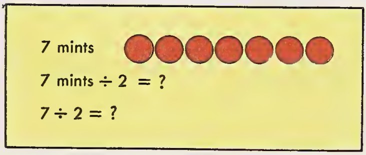
$3\frac{1}{2}$ mints
$2\overline{)7}$ mints
6
1 mint

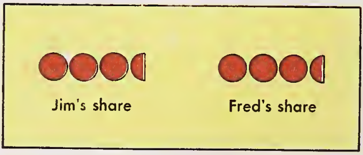
Check
$3\frac{1}{2}$
$+\ 3\frac{1}{2}$
7

5. Jim and Fred shared 7 mints equally. What was each boy's share?

For help, study the pictures.

Explain the work in box D.





6. Nancy cut a 17-foot roll of shelf paper into 3 equal pieces. How long was each piece?

Explain the work in box E.

E

$$\begin{array}{r} 5\frac{2}{3}\text{ ft.} \\ 3\overline{)17}\text{ ft.} \\ \underline{15} \\ 2\text{ ft.} \end{array}$$

Check

$$\begin{array}{r} 5\frac{2}{3} \\ 5\frac{2}{3} \\ \underline{+\ 5\frac{2}{3}} \\ ? \end{array}$$

In division examples we have had before this, we did not divide the remainder. We left it as a whole number.

In boxes A to E, we have divided the remainder by the divisor. We get a proper fraction which we write as part of the quotient. We always reduce the fraction in the quotient to lowest terms.

7. Tell why we divided the remainder in box D by 2 and in box E by 3.

Look at the division in box A. This division can also be written in these ways:

$5 \div 4 = 1\frac{1}{4}$ $\qquad$ $\frac{1}{4}$ of $5 = 1\frac{1}{4}$ $\qquad$ $\frac{5}{4} = 1\frac{1}{4}$

8. Say the answers for examples a to e below. Give the remainder in a fraction each time.

a. $8 \div 3$ $\quad$ **b.** $8 \div 5$ $\quad$ **c.** $5 \div 3$ $\quad$ **d.** $9 \div 4$ $\quad$ **e.** $10 \div 7$

[W]

9. Write in three other ways the divisions in boxes B to E.

10. Write in three other ways each division in Ex. 8.

Divide. Show any remainder in a fraction in lowest terms.

	a	b	c	d	e
11.	$8\overline{)27}$	$3\overline{)19}$	$5\overline{)28}$	$29 \div 3$	$20 \div 6$
12.	$6\overline{)32}$	$4\overline{)38}$	$7\overline{)45}$	$51 \div 8$	$48 \div 9$

13. What is each child's share when

a. 6 children share equally 15 sandwiches?
b. 8 children share equally 20 apples?
c. 3 children share equally 8 sticks of candy?

Deciding When to Divide the Remainder

[O]

A

$$\begin{array}{r} 8,\ \text{R}1\phantom{\ \text{roses}} \\ 3\overline{)25}\ \text{roses} \\ \underline{24}\phantom{\ \text{roses}} \\ 1\ \text{rose} \end{array}$$

1. Helen wants to share 25 roses equally with Ruth and Jane. How many roses will each have?

Is there any way to divide one rose into 3 equal parts so each girl can have $8\frac{1}{3}$ roses? No, it is not sensible to show a fraction as part of the quotient. One of the girls will have to have an extra rose (box A).

B

$$\begin{array}{r} 7,\ \text{R}1\phantom{\ \text{chairs}} \\ 2\overline{)15}\ \text{chairs} \\ \underline{14}\phantom{\ \text{chairs}} \\ 1\ \text{chair} \end{array}$$

2. Can 15 chairs be arranged in 2 rows with the same number of chairs in each row? Why not? Study the work in box B.

C

$$\begin{array}{l} 3\frac{1}{2} \leftarrow \\ 10¢\overline{)35¢} \\ \underline{30} \\ 5¢ \div 10¢ = \frac{5}{10} = \frac{1}{2} \end{array}$$

3. At 10¢ a yard, how many yards of ribbon can Dot buy for 35¢?

35¢ ÷ 10¢ = 3, R5¢.

Here the 3 means 3 yd. There is 5¢ left over. But Dot can buy part of a yard of ribbon, so we divide the remainder as in box C. 5¢ will buy $\frac{5}{10}$, or $\frac{1}{2}$, yd. of ribbon. 35¢ will buy _?_ yd. of ribbon.

D

$$\begin{array}{r} 6,\ \text{R}2¢ \\ 8¢\overline{)50¢} \\ \underline{48} \\ 2¢ \end{array}$$

4. At 8¢ each, how many pencils can Tom buy for 50¢?

50¢ ÷ 8¢ = _?_, R _?_. Can Tom buy part of a pencil with the remaining 2¢? No, so we show the remainder as a whole number with R.

When it is sensible to divide the remainder into parts, we show this by using a fraction in the quotient.

5. Tell why you would or would not express the remainder in a fraction if you were dividing equally:

a. 28 marbles equally among 5 boys;
b. 21 children into 4 equal groups;
c. 15 yards of ribbon into 6 equal pieces.

6. How many gallons in 10 quarts? *Think* this way: "10 ÷ 4 = 2,R2 qt. But 2 qt. = $\frac{2}{4}$, or $\frac{1}{2}$, gal., so 10 qt. = $2\frac{1}{2}$ gal."

On the board, find the missing numbers in Ex. 7 to 12.

7. 15 days = _?_ wk.
8. 90 min. = _?_ hr.
9. 50 oz. = _?_ lb.
10. 17 pt. = _?_ qt.
11. 27 in. = _?_ ft.
12. 90 in. = _?_ yd.

[W]

Write the work for Ex. 13 to 17. Think what each remainder means. Divide a remainder only when it is sensible to do so.

13. How many 8-cent grapefruit can you buy for $1.00?

14. Twenty boys will make how many teams of 9 boys each?

15. At 12¢ a pound, how many pounds of green beans can you buy for 90¢?

16. A half dollar will buy how many 15¢ notebooks?

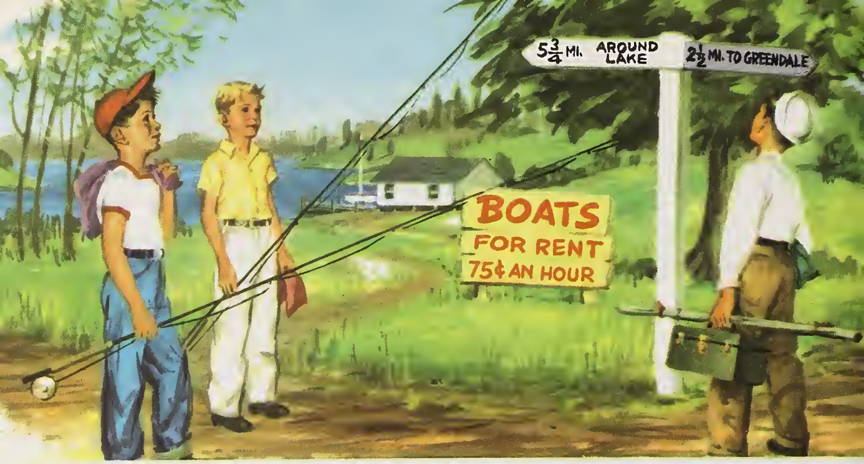
17. What is each person's share when

a. 8 people divide equally 28 pounds of nuts?
b. 5 children share equally 42 marbles?
c. 3 girls share equally 4 apples?
d. 7 boys share 60 stamps equally?

Divide. Express remainders in fractions in lowest terms.

	a	b	c	d	e
18.	$\frac{1}{4}$ of 64	$\frac{1}{8}$ of 42	48 ÷ 7	92 ÷ 8	$7\overline{)103}$
19.	$\frac{1}{6}$ of 50	$\frac{1}{5}$ of 71	52 ÷ 3	89 ÷ 6	$4\overline{)94}$

Extra Practice. Work Set 110.


$5\frac{3}{4}$ MI. AROUND LAKE
$2\frac{1}{2}$ MI. TO GREENDALE
BOATS FOR RENT 75¢ AN HOUR

A Day at Silver Lake

Using fractions in problems [W]

Sam: It didn't take long to get here. It's only 10 o'clock now and we didn't leave Greendale until 9:15.

Ted: Let's hike around the lake before we go fishing.

1. How long did it take the boys to get to the lake?

2. The hike from Greendale and the trip around the lake are how many miles in all?

3. The 3 boys rented one of the boats for 2 hr. and shared the cost equally. How much did each boy pay?

4. Don caught 3 fish which weighed $1\frac{7}{8}$ lb., $2\frac{1}{2}$ lb. and $1\frac{5}{8}$ lb. What was the average weight?

5. One of Sam's fish weighed $2\frac{3}{4}$ lb. and the other one $1\frac{7}{8}$ lb. How much did both weigh? How much heavier was one than the other?

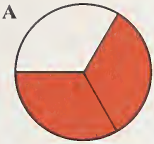
6. "I'm sorry you didn't get a fish, Ted," said Don. "I'll give you one of mine." If Don gives Ted his $1\frac{7}{8}$-pound fish, Don will have _?_ pounds of fish left.

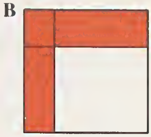
7. In the afternoon the boys swam the 150 yards between markers 6 times. Did they swim about 1 mile or about $\frac{1}{2}$ mile?

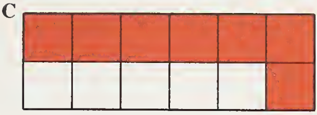
Yes or No? Why?

Review of fraction meanings [O]

1. Is $\frac{2}{3}$ of circle A red?
2. Is $\frac{3}{4}$ of square B red?
3. Is $\frac{7}{10}$ of rectangle C red?
4. Do 27 in. equal $\frac{2}{3}$ yd.?
5. Do 12 oz. equal $\frac{3}{4}$ lb.?
6. Does $\frac{1}{2}$ gal. equal 2 pt.?
7. Is $\frac{3}{4}$ yd. less than $\frac{3}{4}$ ft.?
8. Is $\frac{1}{4}$ yd. half of $\frac{1}{8}$ yd.?
9. Are the fractions $\frac{3}{4}$, $\frac{9}{12}$, and $\frac{12}{16}$ equal?
10. If $\frac{4}{5}$ of 20 tulips are red, are there 16 red tulips?
11. Are 10 quarter hours the same as $2\frac{1}{2}$ hours?
12. Is "14 million" written in figures as "14,000"?







To Bring You Up to Date!

Review; common denominator apparent [O]

Say the answers for row 1. Explain each example.

	a	b	c	d	e	f
1.	$2\frac{1}{3}$ $+4\frac{1}{3}$	$4\frac{3}{8}$ $+2\frac{3}{8}$	$2\frac{7}{16}$ $-\frac{5}{16}$	$5\frac{9}{10}$ $-3\frac{7}{10}$	$3\frac{4}{5}$ $+2\frac{1}{5}$	$2\frac{7}{8}$ $+\frac{5}{8}$
2.	$2\frac{3}{4}$ $-1\frac{5}{8}$	$4\frac{5}{16}$ $-\frac{1}{8}$	$4\frac{1}{12}$ $+\frac{3}{4}$	$3\frac{1}{6}$ $+1\frac{5}{12}$	$7\frac{4}{5}$ $-1\frac{3}{10}$	$5\frac{3}{4}$ $-2\frac{9}{16}$
3.	$2\frac{1}{3}$ $+\frac{5}{6}$	$3\frac{7}{8}$ $+2\frac{5}{16}$	$2\frac{5}{8}$ $-1\frac{3}{4}$	$5\frac{11}{16}$ $-2\frac{3}{8}$	$2\frac{4}{5}$ $5\frac{9}{10}$ $+1\frac{1}{2}$	$4\frac{7}{12}$ $2\frac{2}{3}$ $+\frac{5}{6}$

[W]

Copy and work the examples in rows 2 and 3. Put answers in best form.

Studying Common Denominators

Common denominator apparent and non-apparent [O]

A	B	C
$\frac{1}{2} = \frac{5}{10}$	$\frac{2}{3} = \frac{8}{12}$	$\frac{9}{16} = \frac{9}{16}$
$\frac{7}{10} = \frac{7}{10}$	$\frac{3}{4} = \frac{9}{12}$	$\frac{3}{4} = \frac{12}{16}$
$+\frac{4}{5} = \frac{8}{10}$	$+\frac{11}{12} = \frac{11}{12}$	$+\frac{5}{8} = \frac{10}{16}$

1. In box A, why are $\frac{1}{2}$ and $\frac{4}{5}$ both changed to equal fractions with the common fractional unit $\frac{1}{10}$? What is the common denominator?

2. Why does the smallest fractional unit ($\frac{1}{10}$) in box A have the largest of the three denominators?

3. Tell the common fractional unit and the common denominator in boxes B and C.

4. In each of Ex. A to C, why is the common fractional unit the smallest fractional unit? Why is the common denominator the largest of the three denominators?

5. In box A, can the common denominator, 10, be divided evenly (that is, without remainder) by each of the denominators?

6. In box B and also in box C, show that the common denominator can be divided evenly by each of the denominators.

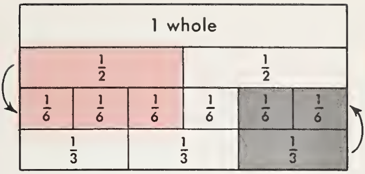
A common denominator must be divisible without a remainder by each of the given denominators.

For the unlike-fractions you have been adding or subtracting, the common denominator has been the largest of the given denominators. Sometimes we must find a common denominator different from any denominator given.

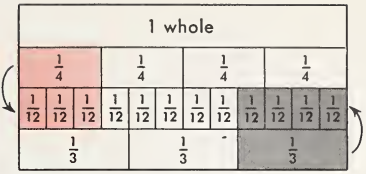
Find three examples below in which the larger denominator cannot be the common denominator. Tell why.

	a	b	c	d	e	f	g
7.	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{9}{10}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{5}{16}$	$\frac{7}{12}$
	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{3}{4}$

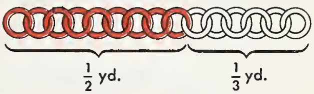
D



E



8. Jack fastened together a red paper chain $\frac{1}{2}$ yd. long and a white paper chain $\frac{1}{3}$ yd. long. About what was the total length of the red and the white chains?



Can you add $\frac{1}{2}$ and $\frac{1}{3}$ (box F) by using diagram D? Try it.

In D, what part of a bar smaller than either $\frac{1}{2}$ or $\frac{1}{3}$ will measure both $\frac{1}{2}$ and $\frac{1}{3}$ exactly? It is $\frac{1}{6}$, so we can change both $\frac{1}{2}$ and $\frac{1}{3}$ to $\frac{1}{6}$'s.

This means that $\frac{1}{6}$ is the common fractional unit and 6 is the common denominator.

Show that 6, the common denominator, is the product of the two given denominators.

F

$$\begin{array}{rcr} \frac{1}{2} & = & \frac{3}{6} \\ +\frac{1}{3} & = & \frac{2}{6} \\ \hline & & \frac{5}{6} \end{array}$$

9. Explain Ex. G by using diagram E.

To what equal fractions with a common fractional unit can $\frac{1}{4}$ and $\frac{1}{3}$ be changed?

The common denominator is _?_. Can it be divided evenly by 4 and also by 3?

G

$$\begin{array}{rcr} \frac{1}{4} & = & \frac{3}{12} \\ +\frac{1}{3} & = & \frac{4}{12} \\ \hline & & \frac{7}{12} \end{array}$$

In box G, the common denominator, 12, is the product of the given denominators, _?_ and _?_.

[W]

Copy and finish the following:

10.

a

$$\begin{array}{rcrcr} \frac{3}{4} & = & \frac{9}{12} & & \\ +\frac{2}{3} & = & \frac{8}{12} & & \\ \hline & & \frac{17}{12} & = & 1\frac{?}{12} \end{array}$$

b

$$\begin{array}{rcrcr} \frac{2}{3} & = & \frac{4}{6} & & \\ +\frac{1}{2} & = & \frac{3}{6} & & \\ \hline & & \frac{7}{6} & = & ? \end{array}$$

c

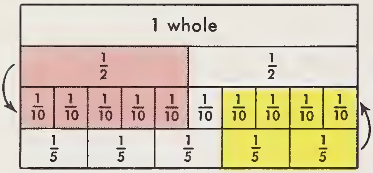
$$\begin{array}{rcr} \frac{1}{3} & = & \frac{?}{12} \\ +\frac{3}{4} & = & \frac{?}{12} \\ \hline & & ? \end{array}$$

d

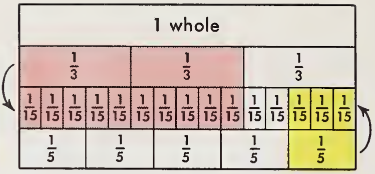
$$\begin{array}{rcr} \frac{1}{4} & = & \frac{?}{12} \\ +\frac{2}{3} & = & \frac{?}{12} \\ \hline & & ? \end{array}$$

For two unlike-fractions, the product of the denominators will always be a common denominator.

A


1 whole
$\frac{1}{2}$ $\frac{1}{2}$
$\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$
$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

B


1 whole
$\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$
$\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$ $\frac{1}{15}$
$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

Changing Both Fractions before Adding

Common denominator non-apparent [O]

C

$$\begin{array}{r} \frac{1}{2} = \frac{5}{10} \\ +\frac{2}{5} = \frac{4}{10} \\ \hline \frac{?}{10} \end{array}$$

1. Box C. Can 5, the larger denominator, be the common denominator? Why not?

How does diagram A show that $\frac{1}{2}$ cannot be changed to $\frac{1}{5}$'s?

Why can $\frac{1}{10}$ be the common fractional unit and 10 be the common denominator?

$\frac{1}{2} = \frac{?}{10}$ $\frac{2}{5} = \frac{?}{10}$ $\frac{5}{10} + \frac{4}{10} = \frac{?}{10}$

D

$$\begin{array}{r} \frac{2}{3} = \frac{10}{15} \\ +\frac{1}{5} = \frac{3}{15} \\ \hline \frac{?}{15} \end{array}$$

2. Explain all the work in box D by using diagram B.

Why can we not use 10 for a common denominator in adding thirds and fifths, as we did in adding halves and fifths? Why can we use 15?

In adding two unlike-fractions, we first try to use the larger of the given denominators as the common denominator. If this is not possible, we have to find a common fractional unit small enough to measure each of the given fractions exactly.

Will the common denominator be larger or smaller than either of the given denominators? Why?

Tell a common denominator to use in adding

3. halves to fifths; to fourths; to thirds; to eighths.

4. thirds to sixths; to fourths; to fifths; to twelfths.

5. fourths to eighths; to fifths; to twelfths; to sixths.

6. fifths to tenths; to fifteenths; to twentieths.

7. In box E, what is the product of the denominators? Then what is a common denominator?

Does this mean that $\frac{1}{20}$ is the common fractional unit?

E

$$\begin{array}{rcl} \frac{3}{4} & = & \frac{15}{20} \\ +\frac{4}{5} & = & \frac{16}{20} \\ \hline & & \frac{31}{20} = 1\frac{11}{20} \end{array}$$

Tell what we think to change $\frac{3}{4}$ and $\frac{4}{5}$ to $\frac{1}{20}$'s.

What like-fractions are added? How can you check?

In rows 8 to 10, find 8 examples in which the larger denominator can be the common denominator. Prove that you are right.

[W]

Copy and add. Change each answer to the best form.

	a	b	c	d	e	f
8.	$\frac{4}{5}$ $\frac{2}{3}$	$\frac{3}{4}$ $\frac{7}{16}$	$\frac{2}{3}$ $\frac{1}{4}$	$\frac{15}{16}$ $\frac{3}{8}$	$\frac{3}{4}$ $\frac{3}{5}$	$\frac{9}{10}$ $\frac{3}{5}$
9.	$\frac{7}{12}$ $\frac{1}{2}$	$\frac{2}{3}$ $\frac{1}{2}$	$\frac{13}{16}$ $\frac{5}{8}$	$\frac{3}{4}$ $\frac{2}{3}$	$\frac{4}{5}$ $\frac{1}{2}$	$\frac{3}{5}$ $\frac{1}{3}$
10.	$\frac{3}{4}$ $\frac{1}{3}$	$\frac{7}{8}$ $\frac{7}{16}$	$\frac{4}{5}$ $\frac{3}{4}$	$\frac{11}{12}$ $\frac{1}{2}$	$\frac{2}{3}$ $\frac{3}{5}$	$\frac{3}{4}$ $\frac{7}{12}$

Row 11 is review work. Copy and work the examples.

11.	$8\frac{4}{5}$ $-3\frac{4}{5}$	$7\frac{5}{12}$ $+8\frac{1}{4}$	9 $-7\frac{3}{5}$	$3\frac{7}{16}$ $+2\frac{3}{4}$	$8\frac{1}{5}$ $-2\frac{7}{10}$	$2\frac{7}{8}$ $+7\frac{9}{16}$

Extra Practice. Work Set 104.

To Keep in Practice in Division

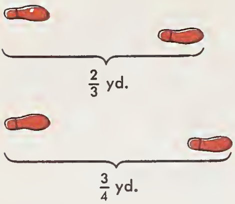
Apparent and non-apparent quotient [W]

Divide and check. Write any remainder with R.

	a	b	c	d	e
1.	$79\overline{)4{,}867}$	$86\overline{)6{,}500}$	$68\overline{)5{,}032}$	$59\overline{)3{,}580}$	$19\overline{)1{,}683}$
2.	$65\overline{)6{,}320}$	$27\overline{)5{,}038}$	$34\overline{)5{,}990}$	$48\overline{)10{,}032}$	$78\overline{)46{,}805}$

Changing Fractions in Subtraction

[O]


$\frac{2}{3}$ yd.
$\frac{3}{4}$ yd.

1. The length of Jane's step is $\frac{2}{3}$ yd. Tim's step is $\frac{3}{4}$ yd. Who has the longer step? How much longer?

To compare unlike-fractions by subtracting, why do we first find a common denominator?

What is the common denominator for Ex. 1? Explain the work in the box.

$$\begin{array}{r} \frac{3}{4} = \frac{9}{12} \\ \underline{-\ \frac{2}{3} = \frac{8}{12}} \\ \frac{1}{12} \end{array}$$

2. Which is the longer time, $\frac{1}{2}$ hr. or $\frac{2}{3}$ hr.? Work this example on the board.

[W]

In rows 8 to 10 on page 251, copy the examples and subtract.

Adding and Subtracting Mixed Numbers

Smallest common denominator [O]

A

$$\begin{array}{r} 2\frac{3}{4} = 2\frac{9}{12} \\ \underline{+4\frac{1}{3} = 4\frac{4}{12}} \\ 6\frac{13}{12} = 7\frac{1}{12} \end{array}$$

B

$$\begin{array}{r} 10\frac{3}{4} = 10\frac{9}{12} = 9\frac{21}{12} \\ \underline{-7\frac{5}{6} = \ \ 7\frac{10}{12} = 7\frac{10}{12}} \\ 2\frac{11}{12} \end{array}$$

C

$$\begin{array}{r} 7\frac{1}{4} = 7\frac{5}{20} \\ \underline{-2\frac{3}{5} = 2\frac{12}{20}} \\ ? \end{array}$$

1. Explain each step of the work in boxes **A** and **B**.

2. In box **B**, what is the product of the given denominators?

24 could have been used as a common denominator, but 12 is smaller and both $\frac{3}{4}$ and $\frac{5}{6}$ can be changed to twelfths. It is easier to use the **smallest common denominator.**

3. On the board, work Ex. B by using 24 for the common denominator. Change the fraction in the sum to lowest terms.

4. On the board, copy and finish the subtraction in box C.

Find 6 examples in rows 5 and 6 in which the smallest common denominator will be the product of the given denominators.

[W]

Copy and work the following. Watch the signs. Be sure that each answer is in best form.

	a	b	c	d	e	f
5.	$7\frac{5}{8}$ $-2\frac{13}{16}$	$9\frac{1}{3}$ $+7\frac{1}{5}$	$8\frac{5}{12}$ $-7\frac{1}{2}$	$7\frac{1}{2}$ $+6\frac{4}{5}$	$2\frac{4}{5}$ $+\frac{7}{10}$	$15\frac{1}{2}$ $-9\frac{2}{3}$
6.	$8\frac{1}{4}$ $+2\frac{4}{5}$	$10\frac{9}{16}$ $-8\frac{3}{4}$	$16\frac{3}{5}$ $+8\frac{1}{3}$	$9\frac{1}{2}$ $-6\frac{7}{10}$	$8\frac{3}{4}$ $-3\frac{1}{5}$	$15\frac{1}{12}$ $+7\frac{2}{3}$
7.	$14\frac{3}{8}$ $+8\frac{1}{3}$	$21\frac{5}{6}$ $+9\frac{1}{4}$	$11\frac{1}{4}$ $-3\frac{2}{3}$	$15\frac{1}{2}$ $-7\frac{2}{7}$	$12\frac{1}{6}$ $-3\frac{1}{2}$	$8\frac{5}{8}$ $+19\frac{2}{3}$
8.	$6\frac{2}{3}$ $-5\frac{7}{8}$	$9\frac{5}{7}$ $+32\frac{1}{2}$	$10\frac{1}{12}$ $-2\frac{1}{4}$	$20\frac{1}{3}$ $-10\frac{7}{8}$	$17\frac{1}{2}$ $+16\frac{2}{3}$	$32\frac{3}{4}$ $+25\frac{3}{5}$

9. Jack worked in his garden $2\frac{1}{4}$ hr. on Friday and $4\frac{2}{3}$ hr. on Saturday. In the two days he worked _?_ hr.

10. He worked how much longer on Saturday than Friday?

11. Jack planted a row of beans $7\frac{5}{6}$ ft. long and a row of peas $10\frac{3}{4}$ ft. long. How much longer was the row of peas?

12. What was the total length of the rows of beans and peas?

13. What is the total length of two rows of corn if each row is $7\frac{1}{2}$ ft. long?

➤ **Extra Practice.** Work Sets 107–109.

Division Practice

Apparent and non-apparent quotients [W]

Copy and divide. Write any remainder with R.

	a	b	c	d	e
1.	$45\overline{)967}$	$74\overline{)4{,}736}$	$87\overline{)8{,}439}$	$75\overline{)3{,}020}$	$36\overline{)2{,}975}$
2.	$58\overline{)7{,}954}$	$14\overline{)2{,}670}$	$96\overline{)8{,}256}$	$64\overline{)62{,}507}$	$16\overline{)\$80.50}$

A Drawing Will Help You

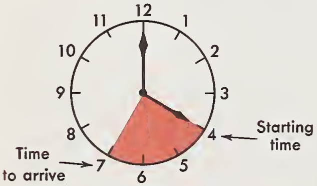
Problem-solving helps [O]

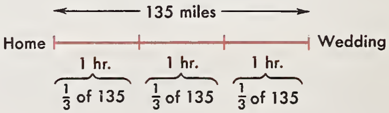
1. Grace and June are putting clean paper on the shelves in their kitchen. Each of the 3 shelves in the top cupboard is 4 ft. long. Each of the 2 shelves in the bottom cupboard is 5 ft. long. Will a 25-foot roll of shelf paper just the right width be enough for all the shelves?

Did the picture help you with problem 1? Often making a drawing will help you understand a problem better.

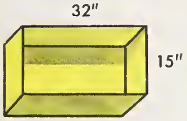
Explain and then solve on the board problems 2 to 4, using the drawings to help you.

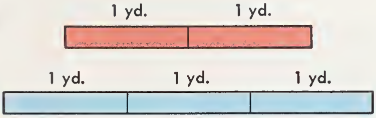
2. The Taylor family is invited to a wedding 135 miles from their home. The wedding is at 7:30 P.M. They plan to start at 4 P.M. and wish to arrive ½ hr. before the wedding. How many miles per hour will they have to drive on the trip?



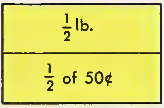


3. Sharon wants to bind with narrow colored crepe paper the top edge of a plant box 32 in. long and 15 in. wide. She has a roll of narrow pink paper containing 2 yd. and a roll of narrow blue paper containing 3 yd. Which color will Sharon have to use? Why?

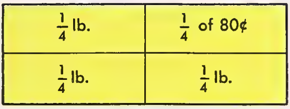




4. Ted bought $\frac{1}{2}$ lb. of gumdrops at 50¢ a pound and $\frac{1}{4}$ lb. of chocolates at 80¢ a pound. How much change did he receive from a dollar bill?



Gumdrops
50¢ a pound



Chocolates
80¢ a pound

Make drawings on the board for problems 5 to 8.

5. Ann is making a square table cover 42″ on a side. She has a piece of lace 5 yd. long. Has she enough lace to go around the table cover?

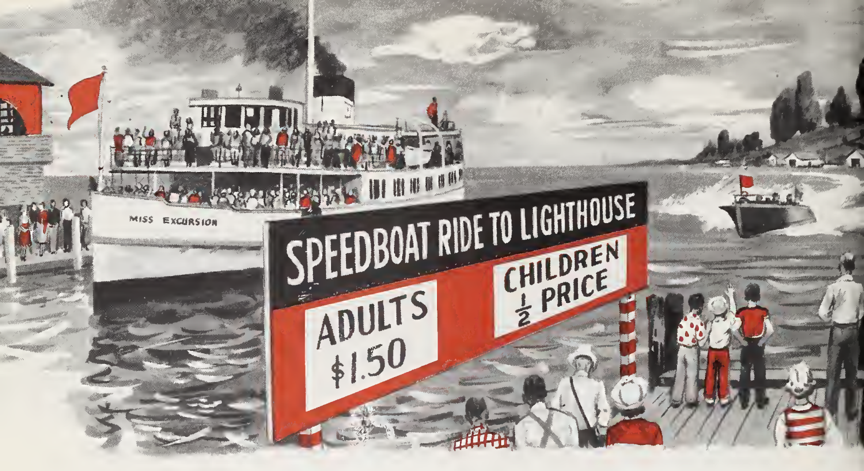
6. A puppet show at the high-school hall starts at 4:30. It takes Jim 45 min. to walk to the hall. At what time must Jim start to get to the show on time?

7. The Allen family started on a trip of 360 miles. They drove 216 miles in the morning. It took them 4 hr. longer to go the rest of the way. How many miles an hour did they average in the afternoon?

8. Helen bought $\frac{1}{2}$ doz. oranges at 68¢ a dozen and 3 lb. of grapes at 24¢ a pound. Will a dollar bill pay for the things?

[W]

Now use the drawings to help you solve Ex. 5–8.



Bob's Vacation on an Island

Using fractions in problems [W]

1. Bob and his family spent their vacation at a cottage on an island. To get there, they spent $4\frac{1}{2}$ hr. on the train and $2\frac{2}{3}$ hr. on a boat. How many hours did they travel? How many hours longer did the train ride take than the boat ride?

2. One day Bob rode horseback for $2\frac{3}{4}$ miles along the lake and for $4\frac{1}{2}$ miles through the woods. How many miles shorter was his ride along the lake than through the woods?

3. One day Bob and his two young brothers went for a speedboat ride to the lighthouse. What did their tickets cost in all?

4. The speedboat covered $8\frac{9}{10}$ miles going to the lighthouse and $12\frac{7}{10}$ miles returning. How long was the round trip? How many miles longer was the return trip than the trip going?

5. From Monday through Friday the big boat took an average of 145 passengers a day to the island. On Saturday and Sunday the average was 350 per day. What was the average number of people going to the island in a week?

6. Bob arrived on the island on Aug. 2 and left on Aug. 23. How many days was he there? How many weeks?

Find the Hidden Questions

[O]

These problems each have one hidden question or more. Tell what the hidden questions are.

1. Sam collects animal pictures. He now has 23. If he trades 1 horse picture for 2 dog pictures, and 3 cat pictures for 1 picture of a panda, how many pictures will he have?

2. Arnold bought 6 valentines marked "3 for 25¢." How much did the valentines cost?

3. Anne's mother gave her 25¢ to buy five 3¢ stamps and five 2¢ stamps. How much change should Anne bring back?

4. Mrs. Shaw found some 25¢ cans of fruit juice marked 19¢ because the paper labels had been torn off. How much money could she save by buying 3 cans?

5. To make white sauce, you use 2 tablespoonfuls of fat for each cup of sweet milk. What part of a cup of fat will be used for 5 cups of milk? (1 c. = 16 tbsp.)

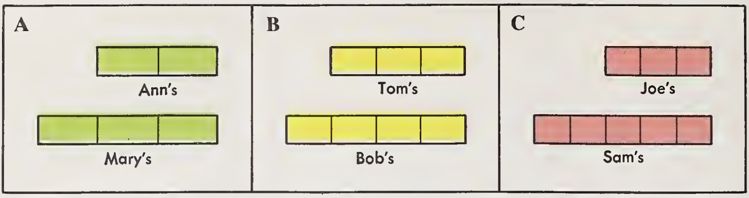
6. Ted and his brothers earn money by collecting and returning empty bottles to the store. One week they returned 10 bottles worth 2¢ each. How many 5¢ ice-cream cones could they buy with the money received?

7. For a campfire picnic, Mrs. Brown allowed 1 lb. of chopped steak for 8 sandwiches. How much chopped steak should she buy in order to give the 12 people in her family group 2 sandwiches apiece?

8. Bill has a new 6-ounce fishing rod with a $7\frac{3}{4}$-ounce casting reel on it. His old 8-ounce fishing rod has a casting reel weighing 9 oz. How much lighter is the new fishing rod and reel than the old rod and reel?

[W]

Write your work to find answers for problems 1 to 8.



Using Fractions in Making Comparisons

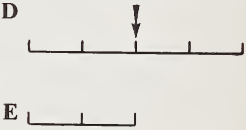
Comparing objects by D. [O]

1. In picture A, Mary's paint box is divided into thirds and Ann's box is as long as two of the thirds. So Ann's box is two thirds, or $\frac{?}{3}$, as long as Mary's.

2. Ann's box is divided into halves, so Mary's box is three halves ($\frac{3}{2}$) the size of Ann's box. In best form, $\frac{3}{2} = ?$

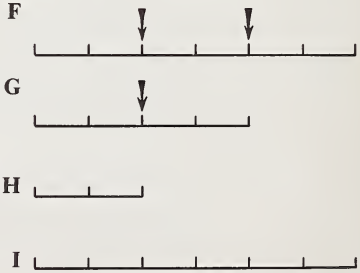
3. Tom's stick of candy (box B) is _?_ as long as Bob's; and Bob's is $\frac{4}{3}$, or $1\frac{1}{3}$ times, as long as Tom's.

4. Joe's box (box C) is _?_ as long as Sam's; and Sam's is _?_, or _?_ times, as long as Joe's.



5. Line D has _?_ equal parts. Line E is as long as 2 of these parts so E is $\frac{2}{4}$, or $\frac{1}{2}$, as long as D. Why do we change $\frac{2}{4}$?

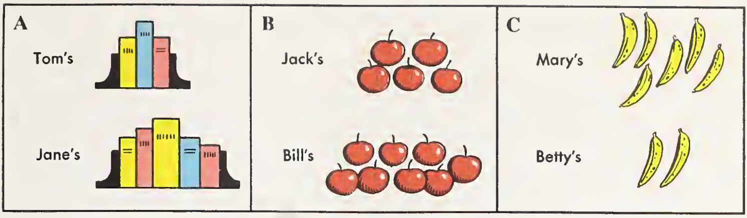
6. Line D is _?_, or _?_ times, as long as line E.



7. Line G equals 4 of the 6 equal parts of line F, so line G is $\frac{?}{6}$, or $\frac{?}{3}$, as long as line F; and line F is _?_, or _?_ times, as long as line G.

8. Use fractions in lowest terms to compare both ways the lengths of line H and line I.

A fraction used to make a comparison should be changed to best form.



Comparing Groups

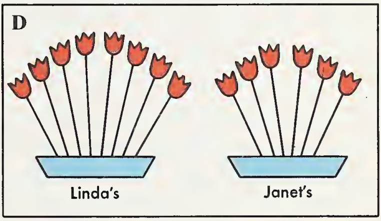
Relation, or ratio [O]

1. In picture A, Tom has _?_ books and Jane has _?_ books. We can say that Tom has $\frac{3}{5}$ as many books as Jane. The fraction $\frac{3}{5}$ tells what part the smaller group is of the larger, so it tells the **relation** of the smaller group to the larger group. We say that the relation is 3 to 5.

2. In picture B, Bill has _?_ apples and Jack has _?_. Bill has $\frac{8}{5}$ as many apples as Jack, and the relation is 8 to _?_.

3. In picture C, Betty has 2 bananas and Mary has 6. Betty has $\frac{2}{6}$, or (in lowest terms) $\frac{1}{3}$, as many bananas as Mary. The relation here is 2 to 6, or 1 to 3. Tell the relation of Mary's bananas to Betty's.

4. Janet's bouquet (box D) has $\frac{?}{8}$, or $\frac{?}{4}$, as many flowers as Linda's. The relation is _?_ to 8, or _?_ to 4. Tell the relation of Linda's flowers to Janet's.



5. At the top of page 258, which picture shows the relation 3 to 4? 2 to 3? 3 to 5?

6. On page 258, which pair of lines shows the relation (longer to the shorter) 3 to 1? 2 to 1? 3 to 2?

A fraction may be used to show the relation of one number to another.

Comparing Numbers by Division

Using a fraction or a mixed number [O]

1. Tom earned \$12 and Joe earned \$9. The relation of Tom's earnings to Joe's is 12 to 9, or $\frac{12}{9}$, or $\frac{4}{3}$. Dividing 4 by 3, we get the mixed number, _?_. The quotient $1\frac{1}{3}$ is the answer to the question, "12 is **how many times as large** as 9?"

2. The relation of Joe's earnings to Tom's is 9 to 12, or $\frac{9}{12}$, or $\frac{?}{?}$. Here the quotient, $\frac{3}{4}$, tells **what part** 9 is of 12.

In comparing numbers by division, we can always show these two relations:

a. How many times as large one number is as another. (This is comparing the larger number with the smaller.)

b. What fractional part one number is of another. (This is comparing the smaller number with the larger.)

For each of the following, make two comparisons by division. First compare the larger number with the smaller. Then compare the smaller with the larger. Ex. 3 has been started for you.

3. Mary picked 18 apples and Jean picked 12.
   18 apples are $\frac{18}{12}$, or $\frac{3}{2}$, or _?_ times 12 apples.
   12 apples are $\frac{12}{18}$, or $\frac{?}{?}$, of 18 apples.

4. Jim sold 15 magazines and Bob sold 10.

5. Sally bought 16 plants and Ruth bought 6.

6. Harry is 9 years old and Bob is 15 years old.

7. Betty worked 20 min. and Carol worked 40 min.

8. Fred's trip took 18 days and Sam's took 15 days.

9. Helen's story about a dog was 3 pages long and Dick's story about a horse was 9 pages long.

10. There were 10 boys and 15 girls in a class.

11. Nancy spent 25¢ for lunch and Doris spent 30¢.

Comparing Numbers by Subtraction and by Division

[O]

Two numbers may be compared by subtraction as well as by division. You have been making the subtraction kind of comparison since you first learned about subtracting.

Answer these questions for problems 1 and 4 on page 260:

1. Joe earned $ _?_ less than Tom, or Tom earned $ _?_ more than Joe.

2. Jim sold _?_ more magazines than Bob, or Bob sold _?_ fewer magazines than Jim.

For each of Ex. 3 to 10 below, compare the larger number with the smaller number, by division (how many times as large) and also by subtraction (how many more). Compare the smaller number with the larger both by division (what part of) and by subtraction (how many less). Study problem 3 below.

3. Don rode his bicycle 15 miles and Ned rode 18 miles.

By division: $\frac{18}{15} = \frac{6}{5} = 1\frac{1}{5}$. Ned rode $1\frac{1}{5}$ times as far as Don.
$\frac{15}{18} = \frac{5}{6}$. Don rode $\frac{5}{6}$ as far as Ned.

By subtraction: $18 - 15 = 3$.
Ned rode 3 miles more than Don.
Don rode 3 miles less than Ned.

4. Sharon baked 25 cookies and Jean baked 10.

5. Fred's tool box is 8 in. wide and 14 in. long.

6. A flagpole is 9 ft. tall and a tree is 15 ft. tall.

7. One week Jack worked 20 hr. and Jim worked only 15 hr.

8. A new bicycle costs $60. A used one costs $40.

9. Kate played the piano for 20 min. in the morning and for 30 min. in the afternoon.

10. We packed 24 cheese sandwiches and 15 meat sandwiches for a picnic.

Work for Young Experimenters

Enrichment activity; related multipliers [O]

If a stamp book has 28 stamps per page, how many stamps are on **a.** 8 pages? **b.** 16 pages? **c.** 24 pages? **d.** 48 pages?

Janet said, "16, 24, and 48 are all related to 8. I can first multiply 8 × 28 and then use that product to find the other three answers."

1. Explain Janet's thinking.

2. Work Janet's examples on the board. Show that her products will be the answers.

3. Carol said, "If I find the answer for d first, I can use that product to get the other three answers." Why can she?

Janet's Way

(For a)	(For b)	(For c)	(For d)
28	224	224	224
×8	×2	×3	×6
224			

Carol's Way

(For d)	(For c)	(For b)
28	$2\overline{)1{,}344}$	$3\overline{)1{,}344}$
×48		
224	(For a)	
1 12	$6\overline{)1{,}344}$	
1,344		

4. On the board, finish Carol's work and explain it.

[W]

Use Janet's and Carol's ways to work these problems:

5. If one can of cherries costs 47¢, what is the cost of
a. 6 cans? **b.** 12 cans? **c.** 18 cans? **d.** 36 cans?

6. If one book costs $2.15, what is the cost of
a. 7 books? **b.** 14 books? **c.** 28 books? **d.** 35 books?

Can You Think Straight?

[W]

Do the work to find the value of *n*.

	a	b	c
1.	$n + 9\frac{1}{2} = 12\frac{3}{4}$	$n \div 15 = 48$	$n + 5\frac{2}{3} = 7\frac{1}{2}$
2.	$4\frac{9}{16} - n = 1\frac{7}{8}$	$3{,}895 \div n = 95$	$6\frac{3}{4} + n = 9$
3.	$7\frac{1}{10} - 2\frac{3}{5} = n$	$8{,}975 \div 36 = n$	$n - 2\frac{4}{5} = 4\frac{1}{2}$
4.	$n - \frac{3}{4} = 2\frac{5}{8}$	$45 \times n = 2{,}070$	$7\frac{5}{6} - n = 1\frac{5}{12}$

Do You Understand?

Test of Information and Meaning 6

A	B	C	D	E	F
$\begin{array}{r} 8 \\ 52\overline{)4,407} \end{array}$	$\begin{array}{r} 8 \\ 73\overline{)6,275} \end{array}$	$\begin{array}{r} 8 \\ 87\overline{)6,554} \end{array}$	$\begin{array}{r} 7\frac{1}{3} \\ \underline{-2\frac{3}{4}} \end{array}$	$\begin{array}{r} 5\frac{2}{3} \\ \underline{-1\frac{1}{2}} \end{array}$	$\begin{array}{r} 6\frac{1}{5} \\ \underline{-3\frac{1}{2}} \end{array}$

1. In which division above is 8 too large a quotient figure? Find out by multiplying mentally.

2. What is the common denominator for Ex. D? E? F?

3. In which example above can we subtract the fraction without borrowing?

4. When an estimated quotient figure is 10, what number do we try first for the quotient figure?

5. Which is larger, 362 or the product of 4×89?

6. Which is the best estimate for the product of $6 \times \$7.98$?

$36 $42 $48 $54 $60

7. To find the value of n in $n \div 75 = 49$ which example do we work? $75 + 49$ $75 - 49$ 49×75

8. How many tens in all are there in 70,402?

9. Copy these examples and write the missing number:

$\frac{7}{8} = \frac{?}{16}$ $\frac{8}{10} = \frac{4}{?}$ $\frac{9}{12} = \frac{?}{4}$ $\frac{3}{5} = \frac{9}{?}$

10. Estimate the average for these: 27, 29, 34, 38, 32

11. What is each girl's share when 3 girls divide equally 2 sandwiches? 7 sandwiches?

12. $\frac{7}{8}$ lb. = _?_ oz. **13.** $2\frac{1}{2}$ gal. = _?_ qt. **14.** $\frac{4}{5}$ of \$20 = ?

15. Which examples below will have a 3-place quotient? a 2-place quotient? a 1-place quotient?

a	b	c	d	e
$86\overline{)4,795}$	$95\overline{)769}$	$37\overline{)9,654}$	$41\overline{)8,796}$	$49\overline{)\$39.65}$

Do You Make Mistakes?

Diagnostic Test 6

Copy and work. You need not check your answers.

	a	b	c	Study Pages	Practice Sets
1.	$34\overline{)251}$	$64\overline{)440}$	$26\overline{)182}$	224–226	73, 74
2.	$48\overline{)3{,}976}$	$59\overline{)3{,}896}$	$38\overline{)\$27.36}$	228–229	75–77
3.	$76\overline{)7{,}358}$	$54\overline{)5{,}302}$	$18\overline{)1{,}656}$	233, 234	78–80
4.	$15\overline{)7{,}860}$	$29\overline{)\$184.73}$	$47\overline{)34{,}686}$	237, 238	85, 88
5.	$43\overline{)30{,}192}$	$34\overline{)24{,}836}$	$56\overline{)50{,}414}$	239, 240	89, 91
6.	$\frac{2}{3}+\frac{3}{4}=?$	$\frac{4}{5}-\frac{1}{2}=?$	$\frac{3}{4}+\frac{3}{5}=?$	248–252	104
7.	$7\frac{1}{2}+4\frac{2}{3}=?$	$6\frac{7}{8}+2\frac{1}{3}=?$	$5\frac{1}{4}-2\frac{5}{6}=?$	252	107–109
8.	Show the remainder in a fraction. $35 \div 4$	$75 \div 6$	$142 \div 8$	242–245	110

Can You Solve Problems?

Problem Test 6

Read and think carefully as you work Ex. 1 to 10.

1. In one class, 12 girls wanted to make aprons as gifts for Mother's Day and $\frac{2}{3}$ as many boys wanted to make telephone-book covers. How many children wanted to make these gifts?

2. Miss Hill bought apron materials at a sale. She bought $6\frac{3}{4}$ yd. of blue, $5\frac{1}{2}$ yd. of pink, and $2\frac{2}{3}$ yd. of yellow. How much more or less than 15 yd. of material did she buy?

3. At 70¢ a yard, what is the cost of 15 yd. of apron material?

4. Jane used $1\frac{1}{2}$ yd. of the yellow material. If Ruth used what was left of the yellow material, how many yards did she use for her apron?

5. After the aprons had been made, $\frac{7}{8}$ yd. of blue material was left. How many yards of blue had been used?

6. Enough plastic material to make 1 doz. telephone-book covers cost $5.40. What was the cost of one cover?

7. At a sale Fred bought a scarf for his mother for 89¢. The regular price was $1.25. How much did Fred save?

8. Jim has saved 25¢ a week for 6 wk. How much more money does he need to buy a plant which costs $2.00?

9. Ann bought 2 boxes of paper napkins and received 20¢ in change from $1. How much did the napkins cost per box?

10. A box of 24 Mother's Day cards cost $3.60. At this rate, what was the cost of one card?

How Well Can You Figure?

Computation Test 6

Copy and work. Show any remainder in division with R. You need not check your answers.

1. $\begin{array}{r}\$45.03\\ -17.89\\ \hline\end{array}$

2. $\begin{array}{r}\$14.25\\ \times 8\\ \hline\end{array}$

3. $64\overline{)500}$

4. $\begin{array}{r}63\\ \times 70\\ \hline\end{array}$

5. $\begin{array}{r}9\frac{2}{3}\\ -4\frac{2}{3}\\ \hline\end{array}$

6. $\begin{array}{r}\$100.56\\ -38.97\\ \hline\end{array}$

7. $\begin{array}{r}\$0.56\\ \times 34\\ \hline\end{array}$

8. $45\overline{)\$18.90}$

9. $\begin{array}{r}\$2.40\\ \times 82\\ \hline\end{array}$

10. $\begin{array}{r}1\frac{3}{4}\\ +6\frac{5}{12}\\ \hline\end{array}$

11. Subtract $2\frac{3}{8}$ from $8\frac{1}{16}$.

12. Add $8\frac{1}{2}$ to $4\frac{3}{5}$.

13. Divide 2,954 by 74.

14. Take $6\frac{1}{2}$ from $7\frac{2}{3}$.

15. Multiply 389 by 675.

16. $168.72 ÷ 37 = ?

17. $4\frac{3}{5}$ plus $5\frac{2}{3}$ = ?

18. 11,340 divided by 28 = ?

19. $6\frac{1}{3}$ minus $4\frac{3}{4}$ = ?

20. $7\frac{1}{2} + 5\frac{3}{4} + 2\frac{5}{6} = ?$

7

WASHINGTON, D.C. to MONTREAL, P.Q.

PAGE 1

0.0 WASHINGTON. Constitution Ave. and 17th St.
Go north on 17th St.
0.7 Bear left onto Connecticut Ave.
0.9 Turn right onto Rhode Island Ave.
Follow U.S. Route 1
7.6 HYATTSVILLE, MD.
8.4 RIVERDALE
9.7 COLLEGE PARK
14.1 BELTSVILLE
MUIRKIRK

What Are Decimal Fractions?

Meaning; reading and writing tenths [O]

Bert and his family have been visiting in Washington, D. C. Now they are discussing their trip home to Montreal. Bert is reading a mileage chart.

He said, "We go 7 tenths of a mile on 17th Street, then turn left onto Connecticut Avenue." (Bert was looking at 0.7)

"What is the first town we come to?" asked his mother.

"It's Hyattsville, only 7 and 6 tenths miles from Washington," said Bert as he looked at 7.6 on the chart.

Janet said, "That looks like seventy-six to me."

"You didn't notice the **decimal point,**" said Bert. "The decimal point is important because it separates the 7 whole miles from 6 tenths of a mile."

"Then Riverdale is 8 and 4 tenths miles away," said Janet.

"That's right," said Bert, "and the next town, College Park, is 9 and 7 tenths miles away."

1. Tell from Bert's mileage chart how far Beltsville is from the place where they started in Washington.

The tenths of a mile on Bert's chart are written with **decimal fractions,** instead of common fractions.

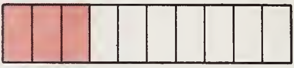
2. Study the chart below. Then, cover the decimal-fraction column and write on the board the decimal fraction for each number given in the common-fraction column.

With Decimal Fraction	With Common Fraction	How to Read
The 0 means that there is no whole number to go with the decimal fraction. 0.7	$\frac{7}{10}$	7 tenths
0.9	$\frac{9}{10}$	9 tenths
7.6	$7\frac{6}{10}$	7 and 6 tenths
8.4	$8\frac{4}{10}$	8 and 4 tenths
9.7	$9\frac{7}{10}$	9 and 7 tenths
14.1	$14\frac{1}{10}$	14 and 1 tenth

Measuring and Counting by Tenths

Equal common and decimal fractions [O]

In the box, when the fraction is written this way $\frac{3}{10}$ it is called a common fraction. When written this way 0.3 it is called a decimal fraction.



Three $\frac{1}{10}$'s, or three tenths, may be written as $\frac{3}{10}$, or 0.3

$2\frac{7}{10}$ is a mixed number and 2.7 is a mixed decimal, but we usually say that any number which contains a decimal fraction is a **decimal.**

In a decimal fraction, the fractional unit and the denominator are named from the decimal place filled by the right-hand figure. The first place at the right of the decimal point shows **tenths.**

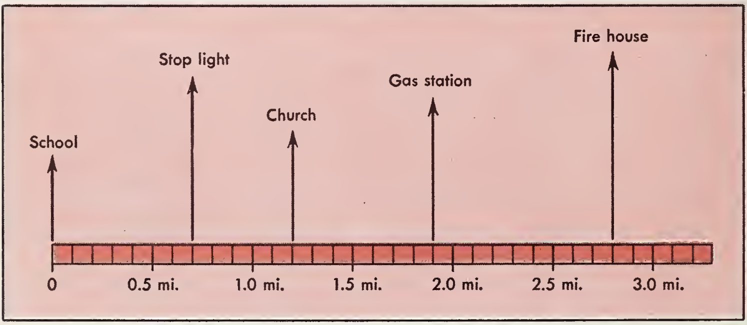
1. Among the following, find 4 pairs of equal numbers:

0.9 $\quad 1\frac{3}{10} \quad 2\frac{7}{10}$ $\quad$ 0.1 $\quad \frac{9}{10}$ $\quad$ 2.7 $\quad \frac{1}{10}$ $\quad$ 1.3

Bob's teacher used the speedometer on her car to measure the distances from school to some nearby landmarks on High Street. Then the class made the diagram shown below and located the landmarks at the correct distances.

2. Into how many equal parts did they divide each whole mile? Then what is the fractional unit? Did the class use common or decimal fractions to show the parts of a mile?

3. How far from school is the stop light? the church? the gas station? the fire house?



Reading and writing tenths

4. Tell what numbers are missing in the table in box A.

5. Count by 0.2's from 0.2 to 2.0 (2 and no tenths, or 2), beginning, "2 tenths, 4 tenths, 6 tenths . . ."

6. Count by 0.5's from 1.5 to 5.5.

A

Counting by Tenths

$\frac{1}{10} = 0.1$	$\frac{11}{10} = 1\frac{1}{10} = 1.1$
$\frac{2}{10} = 0.2$	$\frac{12}{10} = 1\frac{2}{10} = 1.2$
$\frac{3}{10} = 0.3$	$\frac{13}{10} = 1\frac{3}{10} = 1.3$
$\frac{4}{10} = 0.4$	. . . . .
. . .	. . . . . .
. . .	. . . . . .
. . .	. . . . . .
. . .	. . . . . .
. . .	$\frac{19}{10} = 1\frac{9}{10} = 1.9$
$\frac{10}{10} = 1.0$	$\frac{20}{10} = 1\frac{10}{10} = 2.0$

B	C
0.6	3.2
0.8	3.0
1.0	_?_
_?_	_?_
_?_	2.4
_?_	2.2
1.8	_?_
_?_	_?_
2.2	1.6
_?_	_?_

[W]

7. Copy boxes B and C and write the missing numbers.

8. Write as decimals:

$\frac{9}{10}$ $3\frac{7}{10}$ $2\frac{1}{10}$ $\frac{1}{10}$ $3\frac{8}{10}$ $\frac{5}{10}$ $1\frac{2}{10}$ $\frac{6}{10}$

9. Write as common fractions or mixed numbers:

0.2 1.5 0.7 2.1 1.6 1.1 0.4 3.9

10. Arrange the numbers in Ex. 8 in order from smallest to largest. Do the same for the numbers in Ex. 9.

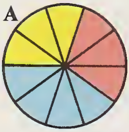
For Your Bulletin Board

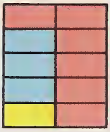
Decimals

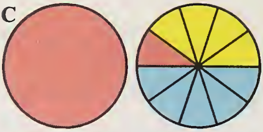
1. Bring to school a mileage chart like Bert's (page 266).

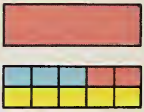
2. Bring a mileage table from a railroad timetable and read the decimals you find on it.

3. Bring road maps and read the distances between towns.

A


B


C


D


Adding and Subtracting Tenths

Carrying in A.; subtracting from whole number [O]

1. In A, B, C, and D, tell what part is red; blue; yellow.

2. In each of A to D, tell the sum of the red parts plus the blue.

3. Explain the additions in box E. Use drawing C to prove that the sums are correct.

4. Tell which drawings go with the additions shown in each of boxes E to H. Explain the additions.

E			F		G	H
		1		1	1	1
red	$1\frac{1}{10}$	1.1	$\frac{6}{10}$	0.6	1.2	0.3
blue	$\frac{5}{10}$	0.5	$\frac{3}{10}$	0.3	0.3	0.4
yellow	$+\frac{4}{10}$	+0.4	$+\frac{1}{10}$	+0.1	+0.5	+0.3
whole	$1\frac{10}{10} = 2$	2.0	$\frac{10}{10} = 1$	1.0	2.0	1.0

5. In A, the 1 whole circle $(\frac{10}{10})$ minus $\frac{7}{10}$ not red = _?_ red. Use drawing A to help you explain the subtraction in box I.

6. Now explain the subtractions in boxes J to L (diagrams B to D).

I			J	K	L
		0 ⑩	0 ⑩	1 ⑩	1 ⑩
whole	$1 = \frac{10}{10}$	$\cancel{1}.\cancel{0}$	$\cancel{1}.\cancel{0}$	$\cancel{2}.\cancel{0}$	$\cancel{2}.\cancel{0}$
not red	$-\frac{7}{10} = -\frac{7}{10}$	−0.7	−0.9	−1.6	−1.5
red	$\frac{3}{10}$	0.3	0.1	0.4	0.5

7. Read these and say the answers:

a	b	c	d	e	f	g	h
0.5	0.8	1.5	2.4	0.9	2.0	3.8	4.0
+0.4	+0.7	+0.3	+3.5	−0.2	−0.5	−1.4	−3.5

Borrowing in subtracting tenths

8. Don's new bicycle has a cyclometer on it. The cyclometer reading below shows that Don has ridden his bicycle only 2 and 7 tenths miles. Which square shows the tenths of a mile?

9. Don rode around the block, a distance of 0.5 mi. What number on the cyclometer changed for each tenth of a mile Don rode? What was the reading on the cyclometer when he returned?

0	0	2	7

Don's cyclometer reading

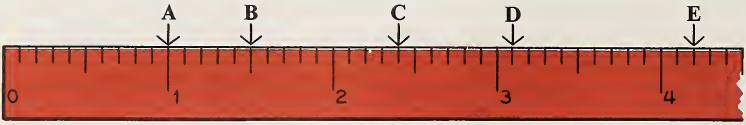
10. What is the difference between the cyclometer reading before Don rode around the block and the reading afterward? 3.2 – 2.7 = ? Why does 0.5 = $\frac{1}{2}$?

11. Then Don rode to the library. When he returned, the reading was 4.1. How far was it to the library and back?

Explain the borrowing in each subtraction in box M. Are the answers 0.9 and $\frac{9}{10}$ equal? Which way do you prefer?

12. Copy on the board and finish the work in boxes N to P.

M		**N**	**O**	**P**
$\begin{array}{r} 4\frac{1}{10} = 3\frac{11}{10} \\ -3\frac{2}{10} = 3\frac{2}{10} \\ \hline \frac{9}{10} \end{array}$	$\begin{array}{r} \overset{3}{\cancel{4}}.\overset{\textcircled{11}}{\cancel{1}} \\ -3.2 \\ \hline 0.9 \end{array}$	$\begin{array}{r} 2\overset{7}{\cancel{8}}.\overset{\textcircled{12}}{\cancel{2}} \\ -7.9 \\ \hline ??.3 \end{array}$	$\begin{array}{r} 30.8 \\ -16.9 \\ \hline ??.9 \end{array}$	$\begin{array}{r} 410.0 \\ -26.3 \\ \hline ??3.7 \end{array}$



Adding and Subtracting Decimals

Tenths; carrying and borrowing [W]

1. Sam brought to school a foot ruler like the one at the top of the page. Into how many equal parts is each inch divided?

2. Write a common fraction and a decimal fraction to tell how far it is on the ruler from the zero (0) point to A; to B; to C; to D; to E.

3. John drew a line 8.7 in. long. Then he extended it 6.3 in. farther. How long was his line then? How much less than 2 ft. was the line?

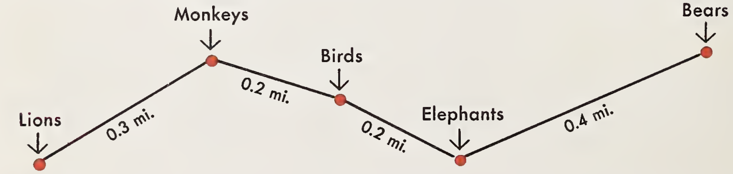
4. The cyclometer on Bob's bicycle registered 74.8 mi. when he started for the zoo and 80.2 mi. when he arrived. How far was it to the zoo?

5. Look below at the map of the paths at the zoo. If Bob rides from the lion cages to the bear pits, how far will he ride?

6. Write the answers for these:

a	b	c	d	e	f
0.7	16.9	87.8	50.3	896.4	710.2
3.9	27.5	−9.7	−17.8	53.9	−93.6
+0.8	+4.6			+719.3	

Extra Practice. Work Set 111.



Our Money System Is a Decimal System

Meaning of hundredths [O]

1. Joe has a dollar bill, Ted has 10 dimes, and their brother Bob has 100 cents. Can the boys buy equal amounts of the same thing with their money? Why?

1 cent is 1 of the 100 equal parts of a dollar, so it is $\frac{1}{100}$ of a dollar. When we write "1 cent" this way—**$0.01**—we are using the decimal way to write $\frac{1}{100}$ of a dollar.

3 cents = $\frac{3}{100}$ of a dollar. We write **$0.03**

1 dime = $\frac{1}{10}$, or $\frac{10}{100}$, of a dollar. We write **$0.10**

2. 7 dimes = $\frac{7}{10}$, or $\frac{70}{100}$, of a dollar. On the board, show how it is written in the decimal way.

3. 12 cents = $\frac{12}{100}$ of a dollar. How is it written?

4. 87 cents = $\frac{?}{100}$ of a dollar. How is it written?

5. What fraction of a dollar is 29 cents? 32¢? $0.70?

$1.08 means 1 and 8 hundredths dollars ($$1\frac{8}{100}$).

$2.36 means 2 and 36 hundredths dollars ($$2\frac{36}{100}$).

Ever since you began to write money numbers with the cent (decimal) point and dollar sign, you have been writing decimals. Any part of a dollar is written as hundredths.

[W]

6. Write as common fractions: 5 cents; 3¢; $0.09; 15¢.

7. Write as mixed numbers: $1.04; $1.18; $2.46; $3.50.

Use decimal points and dollar signs to write these:

8. 6 tenths of a dollar

9. 3 hundredths of a dollar

10. 19 hundredths of a dollar

11. 2 and 4 hundredths dollars

12. 5 and 37 hundredths dollars

13. 6 and 3 tenths dollars

14. $\frac{8}{100}$ of a dollar

15. $\frac{9}{10}$ of a dollar

16. $1\frac{1}{100}$ dollars

17. $3\frac{17}{100}$ dollars

18. $7\frac{58}{100}$ dollars

19. $1\frac{11}{100}$ dollars

So You Won't Forget!

Review of meanings and information [O]

1. A recipe calls for 12 tablespoonfuls of sugar. What part of a cupful is this?

2. To measure 3 gal. of milk by using a quart bottle, how many times do we need to fill the quart bottle?

3. What common denominator do we use in adding
a. *halves* to thirds? to fifths? **b.** *thirds* to fourths? to fifths?

4. How many hours is it from 8 A.M. Fri. to 8 A.M. Sat.?

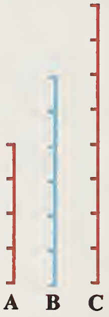
5. Tom was born in 1941, and Jim, on the same date in 1937. Which boy is older? How much older?

6. $8 is what part of $16? of $40? of $80? of $12? of $20?

7. $24 is how many times $4? $3? $6? $16?

8. Use fractions in lowest terms to compare line A with B; A with C; B with C.

9. Use mixed numbers to compare line C with B; C with A; B with A.

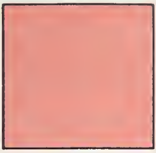


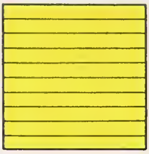
Watch the Signs

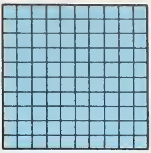
Cumulative review of A., S., M., D. [W]

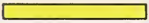
Copy, work, and check. In division examples, write any remainder with R.

	a	b	c	d	e
1.	$90\overline{)5{,}684}$	89×70	$3\frac{7}{8} - 1\frac{3}{4}$	$1\frac{3}{5} + 4\frac{1}{2}$	$74\overline{)5{,}968}$
2.	$82\overline{)\$64.78}$	$\$0.49 \times 56$	$7\frac{1}{2} - 2\frac{4}{5}$	$9\frac{3}{16} + 7\frac{5}{8}$	$56\overline{)\$89.60}$
3.	$67\overline{)\$396.64}$	903×408	$6\frac{1}{4} - 5\frac{2}{3}$	$\frac{2}{3} + 4\frac{1}{2}$	$89\overline{)48{,}967}$

A

1 whole

B

10 tenths ($\frac{10}{10}$)

C

100 hundredths ($\frac{100}{100}$)

D

$\frac{1}{10}$ or 0.1

E

$\frac{1}{100}$ or 0.01

Hundredths as Decimals

Equal common and decimal fractions [O]

1. Squares A, B, and C, above, are equal in size.
A = 1 whole; B = $\frac{?}{10}$; and C = $\frac{?}{100}$.

2. D = $\frac{1}{10}$ of B, or $\frac{?}{100}$ of C. In decimals, D = 0.1, or 0.10

3. E = $\frac{1}{100}$ of C, or 0.01. Which is the decimal fraction?

4. Explain these ways to find the sum of A + D + E:
With fractions: $1 + \frac{1}{10} + \frac{1}{100} = 1 + \frac{10}{100} + \frac{1}{100} = 1\frac{11}{100}$
With decimals: $1 + 0.1 + 0.01 = 1.00 + 0.10 + 0.01 = 1.11$

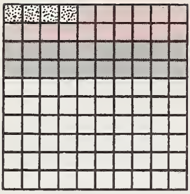
[W]

5. Copy and finish tables F and G below.

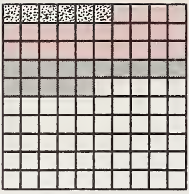
Counting by hundredths

F		G	
$\frac{1}{100} = 0.01$	$\frac{11}{100} = 0.11$	$1\frac{1}{100} = 1.01$	$1\frac{11}{100} = 1.11$
$\frac{2}{100} = 0.02$	$\frac{12}{100} = 0.12$	$1\frac{2}{100} = 1.02$	$1\frac{12}{100} = 1.12$
$\frac{3}{100} = 0.03$	$\frac{13}{100} = 0.13$	$1\frac{3}{100} = 1.03$	$1\frac{13}{100} = 1.13$
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
$\frac{9}{100} = 0.09$	$\frac{19}{100} = 0.19$	$1\frac{9}{100} = 1.09$	$1\frac{19}{100} = 1.19$
$\frac{10}{100} = 0.10$	$\frac{20}{100} = 0.20$	$1\frac{10}{100} = 1.10$	$1\frac{20}{100} = 1.20$

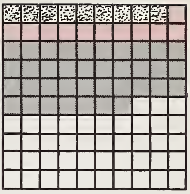
A



B



C



Reading and Writing Hundredths

Equal common and decimal fractions [O]

1. In square A, what part is dotted? red? gray? white?

2. Why is it correct to use all these ways to tell the red part of square A?

$\frac{16}{100}$, or $\frac{10}{100}+\frac{6}{100}$, or $\frac{1}{10}+\frac{6}{100}$

0.16, or 0.10 + 0.06, or 0.1 + 0.06

3. How is each of these parts of square B shown?

0.06 $\frac{15}{100}$ 0.24 $\frac{55}{100}$ 0.20 + 0.04   0.10 + 0.05

4. One whole square the size of B plus the white part of square B = $1+\frac{55}{100}=1\frac{?}{100}$, or 1.00 + 0.55 = 1.55

[W]

5. Write a common fraction and a decimal fraction to tell what part of square C is dotted; red; gray; white.

Write these numbers as decimals:

	a	b	c	d	e	f
6.	$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{100}$	$\frac{27}{100}$	$\frac{89}{100}$	$\frac{99}{100}$
7.	$1\frac{9}{10}$	$2\frac{1}{100}$	$5\frac{8}{100}$	$3\frac{21}{100}$	$17\frac{1}{10}$	$20\frac{69}{100}$

Write these decimals as common fractions or mixed numbers:

8.	0.5	0.05	0.30	0.62	0.76	0.01
9.	1.9	2.3	2.03	4.17	8.99	5.06

10. Arrange the numbers in row 8 from smallest to largest. Do the same in row 9. HELPER: Change the tenths to hundredths so that all decimals will show hundredths.

Extra Practice. Work Set 112.

Adding and Subtracting Decimals

Hundredths; carrying and borrowing [O]

The examples in the box are about square A on page 276. Explain each example. Then on the board, work similar examples for squares B and C on page 276.

Examples about square A on page 276

dotted	$\frac{4}{100}$	0.04		whole	1	=	$\frac{100}{100}$	1.00
red	$\frac{16}{100}$	0.16		not white	$-\frac{40}{100}$	=	$\frac{40}{100}$	−0.40
gray	$+\frac{20}{100}$	+0.20		white			$\frac{60}{100}$	0.60
not white	$\frac{40}{100}$	0.40						

Check each answer in row 1. Which examples are wrong? Work Ex. 1a on the board using common fractions.

	a	b	c	d	e	f
1.	5.09	0.81	7.58	16.24	20.07	18.00
	+7.08	7.45	3.57	−9.36	−8.40	−14.96
	12.17	+9.62	+8.58	6.86	11.67	3.04
		17.88	19.93			

When we add or subtract decimals, tenths are written under tenths, hundredths under hundredths, and so on. This means that the decimal points are in a straight line.

[W]

Copy the following and add or subtract:

2.	8.7	3.95	45.3	8.15	5.02	15.89
	5.4	0.87	−9.7	−0.56	−1.78	36.92
	+0.9	+2.59				+7.86

3. 5.8 + 6.7 + 18.9 + 2.1

4. 18.75 + 3.47 + 0.89 + 3.50

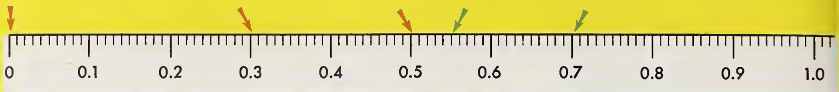
5. 6.00 + 4.08 + 15.78 + 19.46

6. 38.1 − 17.9

7. 20.14 − 8.56

8. 32.00 − 14.37

➤ **Extra Practice.** Work Set 113.



Tenths and Hundredths on a Number Line

[O]

Another way of thinking about tenths and hundredths is to use a number line, like the one above.

1. What do the large divisions on the line show? What do the small divisions show?

2. On the number line above, put your finger at zero (0). Move your finger toward the right to 0.3. Move 2 tenths farther to the right. Where is your finger?

3. You have been adding 0.3 + 0.2 on a number line. What is the sum?

4. Now on the number line, put your finger at 0.7. Why may you think of this as 0.70? Move your finger 15 hundredths to the left. Where is your finger now?

5. You have been subtracting hundredths on a number line. What is the remainder? 0.70 − 0.15 = ?

[W]

Copy and add or subtract in each of the following examples. Check your answer by moving your finger either to the right or to the left along the number line.

	a	b	c
6.	0.5 + 0.5 = ?	0.44 + 0.15 = ?	0.9 − 0.6 = ?
7.	0.2 + 0.7 = ?	0.26 + 0.37 = ?	0.7 − 0.4 = ?
8.	0.4 + 0.5 = ?	0.39 + 0.46 = ?	0.83 − 0.25 = ?
9.	0.3 + 0.5 = ?	0.17 + 0.65 = ?	0.68 − 0.37 = ?
10.	0.1 + 0.7 = ?	0.53 + 0.38 = ?	0.92 − 0.45 = ?

Place Value in Mixed Decimals

[O]

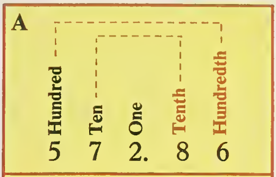
On page 1 of this book, you studied a chart showing the place value and the meaning of each figure in a whole number. When a chart is extended to the right of one's place, it shows a decimal fraction too.

1. Tell the place value of each figure in 572.86, as shown in box A.

2. Tell the meaning of each figure in 572.86, as shown by box B.

3. What separates the whole number from the decimal fraction?

4. Tell the meaning of each figure in **a.** 485.62; **b.** 329.7; **c.** 146.38.



B

5 × 100 = 500
7 × 10 = 70
2 × 1 = 2
8 × 0.1 = 0.8
6 × 0.01 = 0.06
The sum = 572.86

Working with Mixed Decimals

A. and S. [W]

Add or subtract as the sign tells you.

	a	b	c	d	e	f
1.	1.5 +2.4	$8.46 +0.67	$0.98 +0.75	20.3 −5.6	1.4 −0.9	$8.69 −7.04
2.	$4.02 −3.06	9.5 +0.8	50.5 −0.7	$0.44 +0.99	81.7 −42.0	$6.53 +9.98
3.	73.4 −43.6	$9.00 −6.98	6.4 +8.7	$4.15 −2.38	0.9 +7.8	$0.98 −0.29
4.	$7.50 +3.79	23.9 +2.6	$9.56 −8.59	$0.14 +6.88	$1.05 −0.06	20.5 +75.3
5.	82.7 +27.6	$0.09 +0.43	73.0 −55.4	2.0 −0.7	$3.57 −1.52	16.3 −10.8

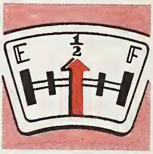
A Trip to Niagara Falls

A. and S.; tenths and hundredths [W]

1. Before Harold and his family started for Niagara Falls, Harold's father bought gasoline. Since the 20-gallon tank took 9.6 gal., how much gasoline was already in the tank?

2. On the way they stopped twice to have the gasoline tank filled. At the first stop, it took 14.7 gal. and at the next, 17.6 gal. How many gallons did they buy at the two stops?

3. When the family reached Niagara Falls, the marker showed that the gasoline tank was half full. Harold figured that they had used _?_ gallons of gasoline for the trip.



4. Harold figured that their car averaged 15.2 miles per gallon of gasoline on the trip to Niagara Falls. On their trip the year before, their old car had averaged only 12.5 miles per gallon. How many more miles per gallon did the new car average than the old one?

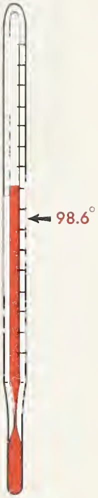
5. A farmer told Harold's father that his corn crop averaged 63.75 bushels per acre the year before and that he expected this year's average to be 65 bushels per acre. How many more bushels per acre did the farmer expect this year than last year?

6. The rainfall was 3.1 in., or 0.2 in. above the normal for the month. What was the normal for the month?

Which Answer Must Be Wrong?

Problems using decimals [O]

Tell which answers must be wrong and why. Do not solve.



1. One day when Sally was ill, her temperature was 1.4 degrees above the normal body temperature of 98.6° shown on the thermometer at the right. What was Sally's temperature that day?

99.2° 100.0° 97.0°

2. At the factory where Sally's father works, the wages were raised 17¢ an hour. What is the new hourly wage of a man who had been paid $1.85 an hour?

$2.12 $1.68 $2.02

3. Tom's uncle lives 10.5 miles from the factory where he works. When the new highway is opened, it will save him 0.8 mi. each way. How far will the round trip be then?

9.7 mi. 19.4 mi. 17.0 mi.

4. When Marge and her mother left home, the speedometer registered 1,052.6 mi. When they arrived at the store, it registered 1,061.5. How many miles had they driven?

89 mi. 8.9 mi. 9.8 mi.

5. Fred's time for the 100-yard dash was 10.8 seconds; Jim's time was 12.1 seconds. How many seconds less time did it take Fred than Jim to run 100 yards?

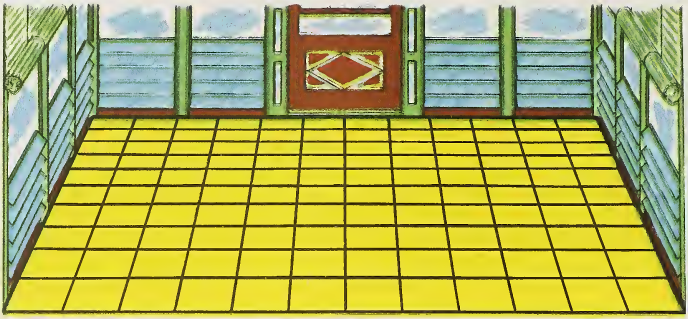
1.3 sec. 1.9 sec. 22.9 sec.

6. During the heavy spring rains, a river rose 1.9 ft. on Monday, 2.7 ft. on Tuesday, and 1.4 ft. on Wednesday. What was the average number of feet the river rose per day?

1.9 ft. 2.0 ft. 3 ft.

[W]

Now go back and solve problems 1 to 6.



Finding the Area of a Rectangle

Meaning of square foot [O]

"Dad and I certainly laid a lot of tiles for the floor of our new porch," said Dan.

"How many were there?" asked Jim.

"I don't know, but let's figure," said Dan. "The tiles are squares 1 foot on a side. The porch is 12 ft. long by 10 ft. wide."

"Well," said Jim, "if the length is 12 feet, you used 12 tiles for 1 row; 24 for 2 rows; 36 for 3 rows."

"Counting by 12's is too slow," interrupted Dan. "The width is 10 feet, so in all we needed 10 rows of 12 tiles each. 10 × 12 = 120, so we laid 120 tiles."

1. Do you agree with Dan? Explain.

2. Draw a square on the board 1 foot on a side. This is a **square foot.** Each tile covered 1 square foot of **surface.**

3. Cut a square of paper 1 foot on a side. The floor took 120 tiles the size of your square foot of paper. The floor contains 120 square feet (sq. ft.) of surface, so its **area** is 120 sq. ft.

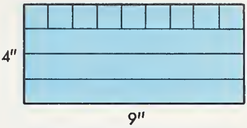
1 square foot (sq. ft.) is a unit of measure for surface, or area.

4. Draw on the board a rectangle 3 ft. long and 2 ft. wide. Then draw lines to divide the rectangle into square feet.

5. On the board, draw a rectangle 9 in. long by 4 in. wide. Then draw lines from side to side an inch apart along the length and also along the width of it. This will mark the rectangle off into **square inches.** Shade 1 square inch (sq. in.).

6. How many square inches are there in the rectangle?

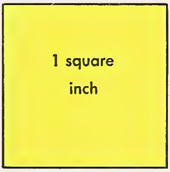
Ted said, "9 square inches along the length, multiplied by 4, the number of rows, equals 36 square inches." Do you agree?



The area of a rectangle is found by multiplying the number of square units in one row of the length by the number of rows in the width.

[W]

7. Cut a square of paper 1 inch on a side. To test your square inch, lay it over the one at the right.



8. Draw a rectangle 3″ wide by 4″ long and another one 4″ by 6″. Use Ted's way to find the area of each rectangle in square inches.

9. Check your answers for Ex. 8 by marking your rectangles off into square inches.

10. Jim varnished his bedroom floor. It is 10 ft. by 14 ft. How many square feet of floor did he varnish?

11. Mary waxed the floor of a kitchen 9 ft. by 12 ft. How many square feet of floor did she wax?

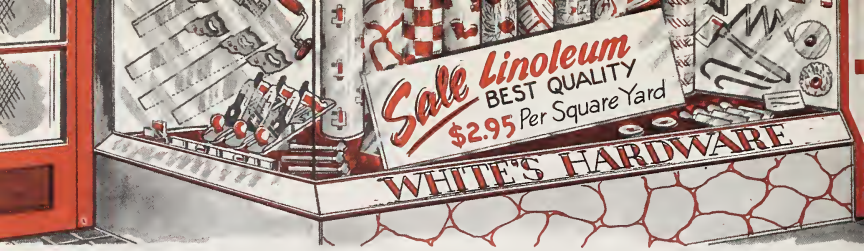
12. Fred's front lawn is 30 ft. by 50 ft. The back lawn is 50 ft. by 60 ft. How many square feet does Fred have to mow?

13. Find the number of square inches in a rectangle

a. 14″ by 20″; **b.** 18″ by 24″; **c.** 25″ by 30″.

14. Find the number of square feet in a rectangle

a. 45′ by 60′; **b.** 75′ by 95′; **c.** 85′ by 120′.



Using Square Measure in Problems

Meaning of square yard: changing to another unit of measure [O]

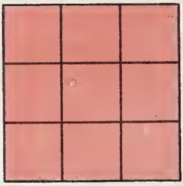
"This would be a good time to buy new linoleum for the playroom floor," said Tom's mother. "It is on sale now."

1. In what unit of measure is linoleum sold at White's?

2. Draw a square 1 yard long and 1 yard wide on large paper. How much would enough linoleum to cover this square yard cost at White's Hardware?

3. Divide the square yard into square feet, as at the right.

4. From wrapping paper cut enough 1-foot squares to cover the square yard.



1 square yard (sq. yd.) equals 9 sq. ft.

5. Tom said, "Our playroom is 18 ft. by 15 ft. so it will take 270 sq. ft of linoleum to cover the floor." Was he right?

6. "Before finding the cost, you must change 270 sq. ft. to square yards," said Tom's mother. "Can you do this?"

7. Tom thought, "9 sq. ft. = 1 sq. yd. There are as many square yards in 270 sq. ft. as there are 9's in 270." Then how many square yards of linoleum were needed? 270 ÷ 9 = ?

8. At $2.95 a square yard, find the cost of the linoleum.

9. How many square yards in 180 sq. ft.? in 360 sq. ft.?

10. How many square feet in 5 sq. yd.? 5 × 9 sq. ft. = ?

11. Jim's father bought linoleum at White's Hardware sale for a room 36 ft. by 24 ft. How many square yards did he buy? Explain the two ways of working shown in the box.

1st way	9 sq. ft. = 1 sq. yd.	**2d way**	3 ft. = 1 yd.
36 sq. ft. ×24 144 72 864 sq. ft.	96 (sq. yd.) 9)864 81 54 54	(Length) 36 ft. = 12 yd. (Width) 24 ft. = 8 yd. 12 sq. yd. ×8 96 sq. yd.	

[W]

12. At $2.95 a square yard, how much did Jim's father pay for 96 sq. yd. of linoleum?

13. Mr. King put plastic tiles on a space 8 ft. by 3 ft. on one kitchen wall and a space 12 ft. by 4 ft. on another wall. At 18¢ a square foot, how much did Mr. King's tile cost?

14. What will carpeting for a room 12 ft. by 21 ft. cost at $8.75 a square yard?

15. Bob's skating rink is 24 ft. by 36 ft. and Fred's is 21 ft. by 39 ft. Find the area of each in square feet; in square yards.

16. Which boy's skating rink is larger? How much larger? Find the difference in size in square feet and in square yards.

Watch the Signs

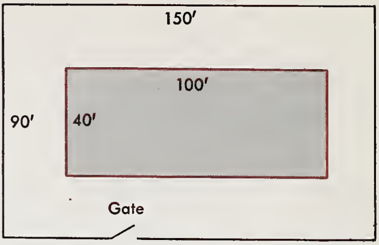
A., S., M., D. [W]

Write your work. In division, write any remainder with R.

	a	b	c	d	e	f
1.	56)449	$7.32 ×8	49.6 +54.8	89 ×36	40.2 −9.6	87)$90.48
2.	34)884	$8\frac{1}{4}$ $-5\frac{7}{8}$	$90.70 −43.95	690 ×204	$4\frac{3}{4}$ $+5\frac{2}{3}$	58)3,654

At the Swimming Pool in the Park

Problems using measures [W]

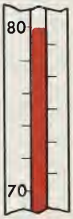


1. Grant Town Park, containing a big swimming pool, is fenced off, as shown. Not counting the gate (6 ft. wide), how many feet of fence were used around the outside of the park? How many yards?

2. At 65¢ a foot, how much did wire for the fence around the park cost?

3. John swam the length of the pool 6 times. How much more or less than $\frac{1}{8}$ mi. did he swim?

4. Betty swam the width of the pool 3 times. How much more or less than 50 yd. did she swim?



5. The part of the thermometer at the right shows the temperature of the air on the day John and Betty went swimming. If the temperature of the water was 73°, how much warmer was the air than the water?

6. Tom was in the pool for 35 min. one morning and 45 min. that afternoon. How much more or less than an hour and a half was Tom in the pool during the whole day?

7. What is the area of the part of the park not used by the pool? Give the area in square feet and also in square yards.

To Keep in Practice

Cumulative review of D. [W]

Copy, divide and check. Write any remainder with R.

	a	b	c	d	e
1.	71)3,849	60)7,860	96)$48.96	78)4,209	86)8,498
2.	49)9,996	59)7,684	67)58,000	38)14,398	19)$86.64

Right or Wrong? Prove It!

Cumulative review of meanings [O]

1. You can serve more people from one quart bottle of grape juice if each person gets $\frac{1}{3}$ cup than if each one gets $\frac{1}{4}$ cup.

2. The numbers 0.3, 0.30 and $\frac{3}{10}$ all have the same value.

3. From 9 P.M. to 6 A.M. is 10 hours.

4. Tom has 56¢ and Jim has 48¢. If each boy spends $\frac{3}{4}$ of his money, Jim will spend more money than Tom.

5. Ann, Mary, and Betty shared equally 2 yd. of ribbon, so each girl had $\frac{2}{3}$ yd. of ribbon.

6. If 24 children at a party each had $\frac{1}{6}$ of a cake, there must have been at least 4 whole cakes at first.

7. 89742693 pointed off into periods is written as 8,9742,693.

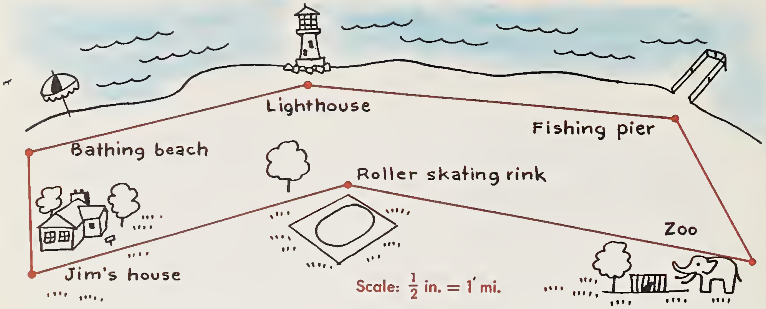
8. $6,009 is exactly 100 times as much as $69.

How Well Can You Follow Directions?

Cumulative review of A., S., M., D. [W]

First estimate an answer. Then find the exact answer. Use your estimate to help. In division, write any remainder with R.

1. Subtract $9.56 from $20.
2. Multiply 56 by 34.
3. Divide 1,890 by 70.
4. 36.2 plus 15.8 = ?
5. 6.9 from 14.1 = ?
6. 89 times $0.97 = ?
7. Find $\frac{1}{8}$ of $146.36.
8. 18.25 minus 9.87 = ?
9. Find $\frac{1}{12}$ of 192.
10. Add: $4\frac{1}{3} + 2\frac{3}{4} + 5\frac{1}{2}$.
11. Divide 5,967 by 63.
12. Multiply 806 by 790.
13. Subtract $6\frac{7}{8}$ from $10\frac{1}{4}$.
14. Divide 2,464 by 28.
15. Take $\frac{3}{5}$ from $2\frac{1}{3}$.
16. Multiply 786 by 600.
17. Divide 7,683 by 16.
18. $10\frac{1}{3}$ less $4\frac{1}{2}$ = ?
19. Divide $74.82 by 86.
20. Multiply $4.50 by 309.



What Is a Scale Drawing?

Meaning [O]

When Jim moved to another city, he promised to write and tell his classmates about his new location. In his first letter he sent a picture map which his father helped him **draw to scale.**

1. On Jim's map, all distances are measured along the roads and *each $\frac{1}{2}$ in. stands for 1 mi.* Then a line 1 in. long represents _?_ mi. and $\frac{1}{4}$ inch represents _?_ mi.

2. How far does Jim live from the bathing beach?

HELPER: Measure the line on the map and change to miles.

3. How far does Jim live from the skating rink? from the zoo?

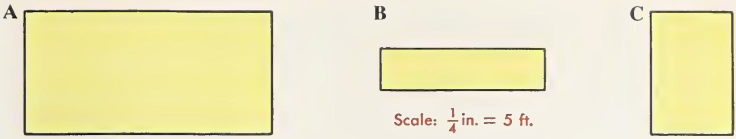
4. If Jim rides his bicycle from the bathing beach to the lighthouse and then to the fishing pier, how far does he ride?

5. How long is the round trip from Jim's to the zoo?

6. If Jim had made his map, or his **scale drawing,** with a scale of *$\frac{1}{4}$ in. representing 1 mi.,* he would have used values in the table below. Say the missing numbers in the table.

Table of values for a scale of *$\frac{1}{4}$ in. = 1 mi.*

Inches on drawing →	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	_?_	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	_?_	$2\frac{1}{4}$	_?_
Miles represented →	1	2	_?_	4	5	_?_	_?_	8	_?_	10



Scale: $\frac{1}{4}$ in. = 5 ft.

Finding Perimeters and Areas

Using scale drawings [W]

1. Each of gardens A to C is drawn to the scale of $\frac{1}{4}$ *in.* = *5 ft.* Then $\frac{1}{2}$ in. = _?_ ft.; $\frac{3}{4}$ in. = _?_ ft.; 1 in. = _?_ ft.

2. Measure each drawing carefully. Then use the scale to find the dimensions of each garden in feet.

3. Copy the above drawings and write on each the length and the width in feet of each actual garden.

4. Use a scale of *1 in. = 10 ft.* and make scale drawings of floor plans with these dimensions:

a. 20 ft. by 30 ft. **b.** 15 ft. by 25 ft. **c.** 20 ft. by 35 ft.

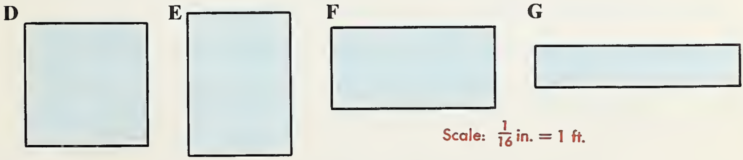
5. Find the perimeter of the floor of each room in Ex. 4.

6. Find the area in square feet of the floor of each room for which dimensions are given in Ex. 4.

7. Find the area in square feet of the rabbit pens D to G.

8. How many feet of fence are needed for each pen?

9. If you have 48 ft. of wire netting and wish to make a rectangular rabbit pen with the greatest possible area, would you make a pen in the shape of D, E, F, or G? Why?



Scale: $\frac{1}{16}$ in. = 1 ft.

Extra Practice. Work Set 115.

Have You a Library Card?

Using a table; practice with ratios [O]

1. The box shows the number of pupils in each grade at the Park School who have library cards. What is the total number of cards?

2. Grade 5 has how many times as many cards as Grade 1? as Grade 2? as Grade 3?

3. Grade 6 has how many times as many cards as Grade 1? as Grade 3? as Grade 4?

Grade	Number of cards
1	2
2	4
3	3
4	9
5	12
6	18
7	15
8	20

In the comparisons above, we divided the larger number by the smaller. You remember that, when we divide a larger number by a smaller one, the answer is a how-many-times number.

When we compare a smaller number with a larger by dividing, the answer is a proper fraction, or a what-part-of number, as in problems 4 and 5 below.

4. Grade 1 has $\frac{2}{4}$, or $\frac{1}{2}$, as many cards as Grade 2. Grade 1 has $\frac{2}{12}$, or $\frac{1}{?}$, as many cards as Grade 5.

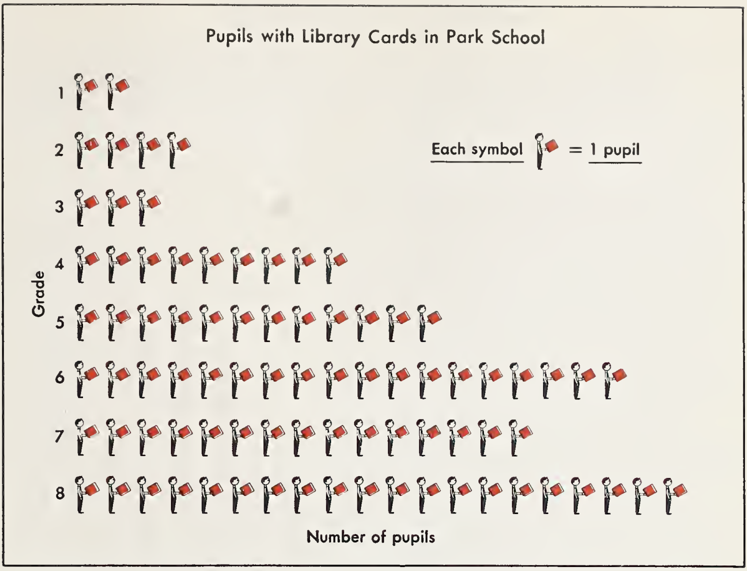
5. Use fractions to compare the number of cards for each of Grades 1 to 5 with the number Grade 6 has. Reduce fractions to lowest terms.

Comparing by using a how-many-times number often gives a mixed number for the answer, as for Ex. 6 below.

6. Grade 6 has how many times as many cards as Grade 5? $18 \div 12 = 1$, R6, but we can express the remainder in a fraction in lowest terms. $18 \div 12 = 1\frac{6}{12}$, or $1\frac{1}{2}$, so 18 is $1\frac{1}{2}$ times 12.

[W]

7. Use a how-many-times number to compare the number of cards Grade 8 has with the number in each of the other grades.



A Pictograph

Meaning [O]

1. This drawing shows the facts in the table on page 290. Why do you think it is called a **pictograph?**

Read the answers for the following from the pictograph:

2. The pictograph above shows by grades how many children in Park School have _?_.

3. Each picture, or symbol, stands for _?_ pupil.

4. How many pupils in Grade 1 have library cards?

5. How many children in Grade 5 have cards?

6. There are twice as many cards in Grade 6 as in Grade _?_.

7. Which grade has the most cards? the fewest cards?

8. Does this pictograph tell how many pupils there are in a grade?

Reading a Bar Graph

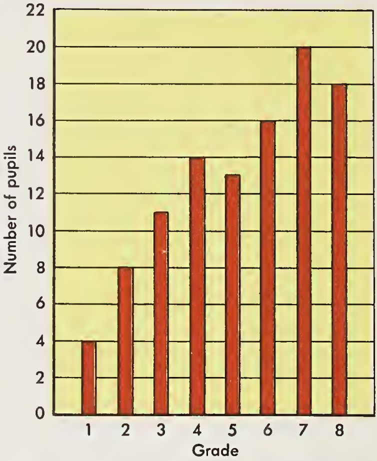
[O]

1. Below is a **bar graph** showing facts about pupils bringing money for Junior Red Cross to Park School. Why do you think it is called a bar graph?

2. The number line along the left side is called a **scale.** Each small space stands for 2 children who brought money on Monday. The scale extends from 0 to _?_.

3. What do the numbers at the bottom of the graph mean?

4. In this bar graph the bars go up and down; that is, they are **vertical.** In the pictograph on page 291 the rows of symbols are **horizontal;** that is, they go _?_ the page.



Pupils Bringing Money on Monday

5. Could the pictograph on page 291 be drawn with the symbols in vertical columns? Could the bar graph here be drawn with horizontal bars? Explain.

6. Which kind of graph—bar graph or pictograph—would be easier to draw?

7. Which kind of graph seems to you easier to read?

[W]

Use the bar graph on this page in writing answers for these:

8. Which grade had the largest number of pupils bringing money on Monday? Which grade had the smallest number?

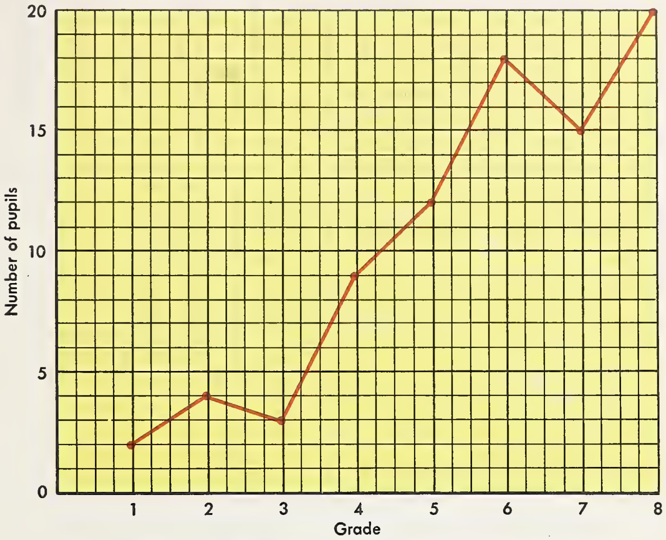
9. How many pupils from each grade brought money?

10. In which grade did 13 pupils bring money? 8 pupils? 18 pupils? 14 pupils?

Reading a Line Graph

[O]

This is a **line graph.** You can read the line graph just as easily as you can read the pictograph or the bar graph.



Pupils Bringing Junior Red Cross Money on Friday

1. The **title,** or name, of a graph tells what the graph is about. What is this line graph about?

2. What does the vertical scale along the left side tell?

3. What do the numbers along the bottom of the graph mean?

4. What does each small space on the vertical scale stand for?

5. Explain how you can tell that 9 children in Grade 4 brought Junior Red Cross money on Friday.

6. Read for each grade the number of pupils who brought money for Junior Red Cross.

7. See if you can find a graph in your newspaper or in a magazine. Bring it to school and explain it to the class.

Reading Graphs

3 kinds of graphs [W]

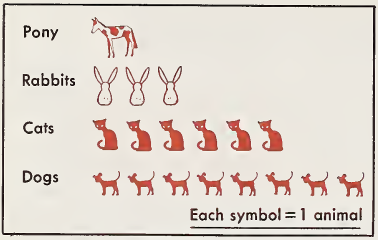


Fig. 1. Animals in Our Pet Show

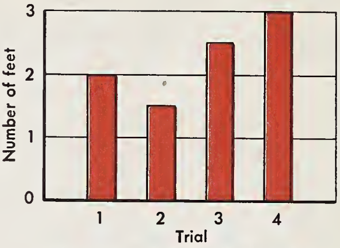


Fig. 2. Pete's High Jumps

On your paper, write answers for Ex. 1 to 9.

Questions about Fig. 1:

1. What kind of graph is it? What is the graph about?

2. How many of each kind of animal were in the Pet Show?

Questions about Fig. 2:

3. On what trial did Pete jump $2\frac{1}{2}$ ft.?

4. How many feet did Pete jump on the other trials?

Questions about Fig. 3:

5. On this graph, what was the highest temperature? At what time was it?

6. When was the temperature at the freezing point?

7. What was the temperature at 7 A.M.? at noon?

8. At what time was the temperature $28\frac{1}{2}$°?

9. What was the temperature at 4 P.M.?

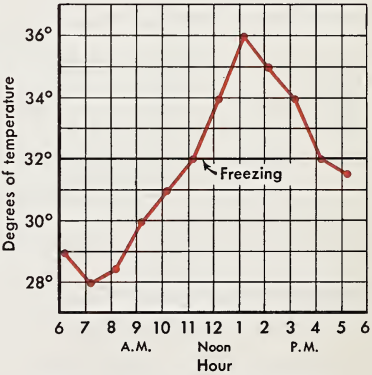


Fig. 3. Hourly Temperatures on a Winter Day

10. The pictograph in Fig. 4 uses two kinds of symbols in the same row, so read it carefully in writing answers for a to g.

a. Which family has the most children?

b. Which of the families has 3 girls?

c. What is the total number of children on Joe's street?

d. How many of the children on Joe's street are girls?

e. How many of the children are boys?

f. Which boy has 2 sisters?

g. Which girl has 2 sisters?

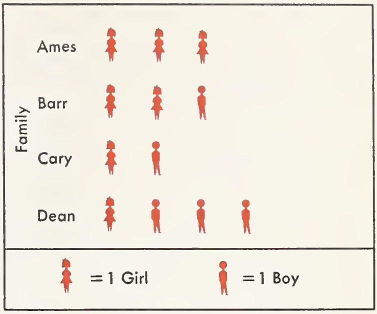


Fig. 4. Children on Joe's Street

[O]

11. Fig. 5 shows how Jim's lamb gained in weight during its first 6 months. Each space on the scale for pounds stands for what part of a pound?

12. The lamb's weight at birth is shown by the dot above 0 on the months' scale. How much did he weigh at birth?

13. How can you tell at once that the lamb's weight increased from month to month?

14. The line between the points for the first and second months is longer than any other 1-month distance on the graph. What does this tell about the gain in weight during the second month?

15. Read the lamb's weight for each month.

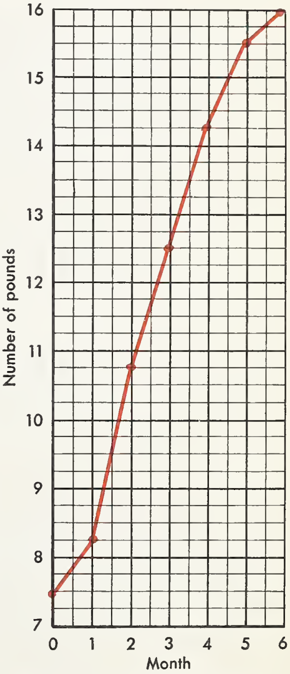
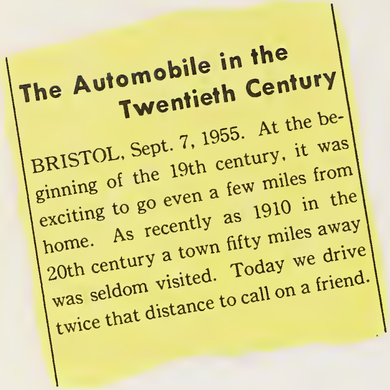


Fig. 5. How Jim's Lamb Gained Weight

Measuring Time by Centuries

Using a number line [O]



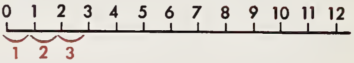
The Automobile in the Twentieth Century

BRISTOL, Sept. 7, 1955. At the beginning of the 19th century, it was exciting to go even a few miles from home. As recently as 1910 in the 20th century a town fifty miles away was seldom visited. Today we drive twice that distance to call on a friend.

Don brought this newspaper clipping to school. "It seems to me," he said, "that both 1955 and 1910 are in the 19th century."

1. What do you think?

The years of Don's life can be shown on this number line:

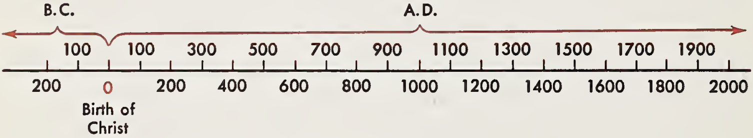


On the number line, 0 is for the minute Don was born. From 0 to 1 he was in his 1st year, his year 1 (shown in red). From 1 to 2 he was in his 2d year, or year 2. From 2 to 3 he was in year 3.

2. On the line, point to Don's 4th year, that is, his year 4.

3. The part of the line between 4 and 5 shows what year?

4. Next month, Don will celebrate his eleventh birthday. In what year is he now?



On this longer number line, each space stands for a century, or 100 years. The birth of Christ is at zero. The years and centuries since the birth of Christ are called A.D. (Anno Domini, meaning "in the year of our Lord"). Years and centuries before Christ's birth are called B.C. (meaning "before Christ").

5. On the century line, find the following points:

A.D. 500; 200 B.C.; A.D. 1900.

Do you see that time from 0 through the year 100 would be called in the first century? Then the years, one hundred one, one hundred two, and so on, are in the second century, even though their names begin with the word, "one."

In the same way, the years, two hundred one, two hundred two, and so on, come in the third century.

Tell in what century these years come:

6. 601, 602, and so on, are in the _?_ century.

7. 1901, 1902, 1955, and so on, are in the _?_ century.

In the sentences below, tell in what century each year was.

8. The first printed book in Europe was made about 1450.

9. Champlain founded Quebec in 1608.

10. Mackenzie reached the Pacific by land in 1793.

11. Alexander Graham Bell was born in Ontario in 1847.

12. The first airplane flight was in 1903.

13. In what century was each of these years? Tell whether it was early, near the middle, or late in the century.

1776 1607 1492 1545 1918 1812

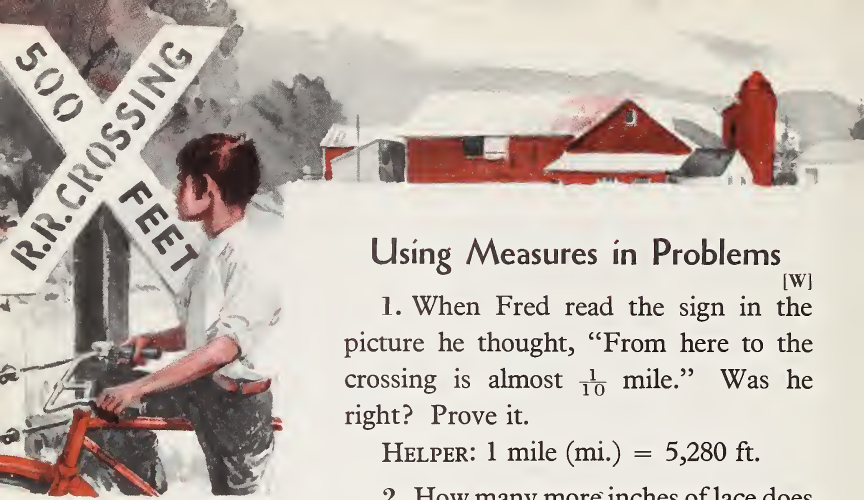
Can You Think Straight?

[W]

Do the work to find *n* in the following:

	a	b	c
1.	$n + 8.6 = 15.4$	$n + 3\frac{2}{5} = 8\frac{1}{10}$	$10.34 - n = 4.65$
2.	$7.6 + n = 10.2$	$9\frac{2}{3} + n = 15\frac{1}{4}$	$n - 7.15 = 8.26$
3.	$n - 3.9 = 4.2$	$n - 1\frac{7}{8} = 5\frac{9}{16}$	$19.65 + n = 30.10$
4.	$16.8 - n = 7.9$	$6\frac{3}{4} - n = 1\frac{2}{3}$	$n + 4.08 = 19.22$
5.	$n + 17.3 = 30.0$	$n - 2\frac{5}{12} = 1\frac{5}{6}$	$16.20 - 9.14 = n$

Extra Practice. Work Set 114.



Using Measures in Problems

[W]

1. When Fred read the sign in the picture he thought, "From here to the crossing is almost $\frac{1}{10}$ mile." Was he right? Prove it.

HELPER: 1 mile (mi.) = 5,280 ft.

2. How many more inches of lace does it take to go around a square cloth 54 in. on a side than around a cloth 1 yd. on a side? Make diagrams.

3. Mrs. Ford used 8 yd. of material costing $1.20 a yard to make 3 dresses. What was the average cost of the material for a dress?

4. From February 1 to March 1, Tom earned $29.40. What was the average amount he earned a week?

5. Jim earned $5.20 in 8 hr. and Bob earned $4.90 in 7 hr. At what rate an hour was each boy paid?

6. Ann is 59 in. tall and her sister Belle is 5 ft. 4 in. tall. Which girl is taller? How much taller?

7. Mr. Harmon drove 252 mi. at the rate of 42 mi. an hour. Mr. Day drove 266 mi. at the rate of 38 mi. an hour. Whose trip took the longer time? How much longer?

8. Jim mowed a lawn 85′ by 50′. Bob mowed one 90′ by 45′. Which lawn contains more square feet? How many more?

9. Helen worked at her music lesson for $1\frac{1}{2}$ hr. on Mon., $\frac{3}{4}$ hr. on Tues., $1\frac{1}{4}$ hr. on Wed., $\frac{1}{2}$ hr. on Thurs., and 1 hr. on Fri. Helen averaged _?_ hr. a day at her music lesson.

Do You Understand?

Test of Information and Meaning 7

1. Copy these measures in order of size from smallest to largest: **a.** quart, cup, gallon, pint; **b.** mile, inch, yard, foot.

2. How long is it from 8:30 P.M. to 10:15 P.M.?

3. Copy each number which has a value less than 1:

$\frac{2}{3}$ $\frac{5}{4}$ $\frac{9}{8}$ $\frac{5}{6}$ $\frac{3}{2}$ $\frac{8}{9}$ $\frac{6}{5}$ $\frac{4}{5}$

4. Copy each number which has a value greater than 1:

0.67 1.1 0.4 8.2 0.9 2.0 0.38 1.3

5. Copy in order of size from largest to smallest:

$\frac{5}{6}$ $2\frac{3}{4}$ $\frac{1}{3}$ $2\frac{1}{2}$ 3 $1\frac{7}{8}$ $1\frac{1}{4}$ $\frac{1}{8}$

6. Copy in order, beginning with the largest:

a. 0.46 4.6 0.64; **b.** 0.21 0.2 2.1

7. Draw a rectangle 2″ by 3″ marked off into square inches.

8. Color the perimeter of the rectangle you drew in Ex. 7.

9. Write these decimals in words: **a.** 0.4 **b.** 2.8 **c.** 0.46

10. Write with decimal fractions: **a.** $\frac{3}{10}$ **b.** $\frac{49}{100}$ **c.** $1\frac{7}{10}$

11. Write with common fractions: **a.** 0.7 **b.** 0.19 **c.** 2.3

12. Six dollars is what part of $12? of $18? of $30?

13. Which is more **a.** 30 oz. or 2 lb.? **b.** 50 in. or 4 ft.?

14. Write as fractions: **a.** $7 \div 8$; **b.** $10\overline{)3}$; **c.** 4 divided by 5.

15. Write in figures: six million two hundred thousand.

16. What is the smallest common denominator for adding or subtracting thirds and fourths?

17. If a scale drawing has a scale $\frac{1}{2}'' =$ *10 mi.*, then on the drawing 2 in. will equal how many miles?

18. Tom took his first airplane trip in 1945. How many years ago was that?

Do You Make Mistakes?

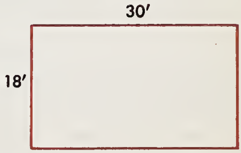
Diagnostic Test 7

		Study Pages	Practice Sets
1.	Copy, and write the missing numbers. **a.** 2.0, 2.1, _?_, 2.3, _?_, _?_ **b.** 4.4, 4.6, _?_, 5.0, _?_, 5.4 **c.** 1.01, 1.02, _?_, _?_, 1.05 **d.** 2.17, 2.19, _?_, 2.23, _?_	268–269, 275	116
2.	a b c 7.8 8.7 315.0 +4.3 −2.9 −198.6	270–272	117
3.	15.87 42.03 60.01 +9.56 −19.75 −59.86	277	118
4.	Find the areas of these rectangles: **a.** 15″ by 24″; **b.** 48′ by 56′	282–283	115
5.	Copy and write the missing number: **a.** 75 sq. yd. = _?_ sq. ft. **b.** 486 sq. ft. = _?_ sq. yd.	284–285	119

Can You Solve Problems?

Problem Test 7

Read and think carefully as you work problems 1 to 10.



1. Joe and his mother are planting the garden shown in the diagram. What is its area in square feet? in square yards?

2. They will plant a border around the sides of the garden. How many feet is this perimeter?

3. Joe has $2.50. How much more money does he need to buy 7 doz. petunia plants at 39¢ a dozen?

4. Joe's mother paid $1.80 for a box of pansy plants containing 3 doz. plants. How much was this per plant?

5. On Saturday, Joe worked in the garden from 9:15 A.M. to 11:30 A.M. Use a mixed number to tell how long this was.

6. How many minutes is it from 9:15 A.M. to 11:30 A.M.?

7. One week Joe's mother worked in the garden these hours: Monday, $2\frac{1}{4}$ hr.; Wednesday, $1\frac{2}{3}$ hr.; Friday, $2\frac{1}{3}$ hr.; Saturday, $1\frac{3}{4}$ hr. How many hours a day did she average?

8. Joe's father bought a 50-foot piece of garden hose for $5.98, a shovel for $2.89, a rake for $2.50, and a garden cart for $7.75. How much change did he receive from a $20 bill?

9. One summer it rained a total of 4.10 in. during June, 2.75 in. during July, and 2.15 in. during August. What was the total amount of rainfall during these 3 months?

10. What was the difference between the rainfall in June and July? in June and August? in July and August?

How Well Can You Figure?

Computation Test 7

In division, show any remainder with R.

1. $\begin{array}{r} \$0.92 \\ \times 75 \\ \hline \end{array}$ **2.** $\begin{array}{r} 2\frac{7}{8} \\ -1\frac{3}{4} \\ \hline \end{array}$ **3.** $\begin{array}{r} 658 \\ \times 16 \\ \hline \end{array}$ **4.** $\begin{array}{r} 18.5 \\ -9.7 \\ \hline \end{array}$ **5.** $52\overline{)\$18.20}$

6. $\begin{array}{r} 867.4 \\ +58.9 \\ \hline \end{array}$ **7.** $\begin{array}{r} 9\frac{1}{12} \\ -5\frac{3}{4} \\ \hline \end{array}$ **8.** $\begin{array}{r} \$49.67 \\ \times 24 \\ \hline \end{array}$ **9.** $\begin{array}{r} 17\frac{1}{2} \\ -12\frac{3}{5} \\ \hline \end{array}$ **10.** $78\overline{)3{,}926}$

11. 39.6 from 407.0 = ?

12. 89.7 + 4.5 + 17.9 = ?

13. 52.10 minus 47.38 = ?

14. Multiply 570 by 906.

15. Divide 7,985 by 89.

16. $1\frac{3}{4} + 2\frac{1}{3} + 7\frac{1}{2} = ?$

17. Divide $95.14 by 67.

18. Multiply 908 by 650.

19. 15.87 + 62.95 + 8.48 = ?

20. Divide 3,905 by 18.

The 81 Addition Facts

Sums through 18

$$\begin{array}{rrrrrrrrr} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \end{array}$$

$$\begin{array}{rrrrrrrrr} 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 & 2 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \end{array}$$

$$\begin{array}{rrrrrrrrr} 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 \end{array}$$

$$\begin{array}{rrrrrrrrr} 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 \end{array}$$

$$\begin{array}{rrrrrrrrr} 5 & 5 & 5 & 5 & 5 & 5 & 5 & 5 & 5 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 \end{array}$$

$$\begin{array}{rrrrrrrrr} 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 & 6 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 \end{array}$$

$$\begin{array}{rrrrrrrrr} 7 & 7 & 7 & 7 & 7 & 7 & 7 & 7 & 7 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 8 & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 \end{array}$$

$$\begin{array}{rrrrrrrrr} 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 & 8 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 \end{array}$$

$$\begin{array}{rrrrrrrrr} 9 & 9 & 9 & 9 & 9 & 9 & 9 & 9 & 9 \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \\ \hline 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 \end{array}$$

The 81 Subtraction Facts

Minuends through 18

$\begin{array}{r} 2 \\ -1 \\ \hline 1 \end{array}$	$\begin{array}{r} 3 \\ -1 \\ \hline 2 \end{array}$	$\begin{array}{r} 4 \\ -1 \\ \hline 3 \end{array}$	$\begin{array}{r} 5 \\ -1 \\ \hline 4 \end{array}$	$\begin{array}{r} 6 \\ -1 \\ \hline 5 \end{array}$	$\begin{array}{r} 7 \\ -1 \\ \hline 6 \end{array}$	$\begin{array}{r} 8 \\ -1 \\ \hline 7 \end{array}$	$\begin{array}{r} 9 \\ -1 \\ \hline 8 \end{array}$	$\begin{array}{r} 10 \\ -1 \\ \hline 9 \end{array}$
$\begin{array}{r} 3 \\ -2 \\ \hline 1 \end{array}$	$\begin{array}{r} 4 \\ -2 \\ \hline 2 \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline 3 \end{array}$	$\begin{array}{r} 6 \\ -2 \\ \hline 4 \end{array}$	$\begin{array}{r} 7 \\ -2 \\ \hline 5 \end{array}$	$\begin{array}{r} 8 \\ -2 \\ \hline 6 \end{array}$	$\begin{array}{r} 9 \\ -2 \\ \hline 7 \end{array}$	$\begin{array}{r} 10 \\ -2 \\ \hline 8 \end{array}$	$\begin{array}{r} 11 \\ -2 \\ \hline 9 \end{array}$
$\begin{array}{r} 4 \\ -3 \\ \hline 1 \end{array}$	$\begin{array}{r} 5 \\ -3 \\ \hline 2 \end{array}$	$\begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array}$	$\begin{array}{r} 7 \\ -3 \\ \hline 4 \end{array}$	$\begin{array}{r} 8 \\ -3 \\ \hline 5 \end{array}$	$\begin{array}{r} 9 \\ -3 \\ \hline 6 \end{array}$	$\begin{array}{r} 10 \\ -3 \\ \hline 7 \end{array}$	$\begin{array}{r} 11 \\ -3 \\ \hline 8 \end{array}$	$\begin{array}{r} 12 \\ -3 \\ \hline 9 \end{array}$
$\begin{array}{r} 5 \\ -4 \\ \hline 1 \end{array}$	$\begin{array}{r} 6 \\ -4 \\ \hline 2 \end{array}$	$\begin{array}{r} 7 \\ -4 \\ \hline 3 \end{array}$	$\begin{array}{r} 8 \\ -4 \\ \hline 4 \end{array}$	$\begin{array}{r} 9 \\ -4 \\ \hline 5 \end{array}$	$\begin{array}{r} 10 \\ -4 \\ \hline 6 \end{array}$	$\begin{array}{r} 11 \\ -4 \\ \hline 7 \end{array}$	$\begin{array}{r} 12 \\ -4 \\ \hline 8 \end{array}$	$\begin{array}{r} 13 \\ -4 \\ \hline 9 \end{array}$
$\begin{array}{r} 6 \\ -5 \\ \hline 1 \end{array}$	$\begin{array}{r} 7 \\ -5 \\ \hline 2 \end{array}$	$\begin{array}{r} 8 \\ -5 \\ \hline 3 \end{array}$	$\begin{array}{r} 9 \\ -5 \\ \hline 4 \end{array}$	$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$	$\begin{array}{r} 11 \\ -5 \\ \hline 6 \end{array}$	$\begin{array}{r} 12 \\ -5 \\ \hline 7 \end{array}$	$\begin{array}{r} 13 \\ -5 \\ \hline 8 \end{array}$	$\begin{array}{r} 14 \\ -5 \\ \hline 9 \end{array}$
$\begin{array}{r} 7 \\ -6 \\ \hline 1 \end{array}$	$\begin{array}{r} 8 \\ -6 \\ \hline 2 \end{array}$	$\begin{array}{r} 9 \\ -6 \\ \hline 3 \end{array}$	$\begin{array}{r} 10 \\ -6 \\ \hline 4 \end{array}$	$\begin{array}{r} 11 \\ -6 \\ \hline 5 \end{array}$	$\begin{array}{r} 12 \\ -6 \\ \hline 6 \end{array}$	$\begin{array}{r} 13 \\ -6 \\ \hline 7 \end{array}$	$\begin{array}{r} 14 \\ -6 \\ \hline 8 \end{array}$	$\begin{array}{r} 15 \\ -6 \\ \hline 9 \end{array}$
$\begin{array}{r} 8 \\ -7 \\ \hline 1 \end{array}$	$\begin{array}{r} 9 \\ -7 \\ \hline 2 \end{array}$	$\begin{array}{r} 10 \\ -7 \\ \hline 3 \end{array}$	$\begin{array}{r} 11 \\ -7 \\ \hline 4 \end{array}$	$\begin{array}{r} 12 \\ -7 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ -7 \\ \hline 6 \end{array}$	$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$	$\begin{array}{r} 15 \\ -7 \\ \hline 8 \end{array}$	$\begin{array}{r} 16 \\ -7 \\ \hline 9 \end{array}$
$\begin{array}{r} 9 \\ -8 \\ \hline 1 \end{array}$	$\begin{array}{r} 10 \\ -8 \\ \hline 2 \end{array}$	$\begin{array}{r} 11 \\ -8 \\ \hline 3 \end{array}$	$\begin{array}{r} 12 \\ -8 \\ \hline 4 \end{array}$	$\begin{array}{r} 13 \\ -8 \\ \hline 5 \end{array}$	$\begin{array}{r} 14 \\ -8 \\ \hline 6 \end{array}$	$\begin{array}{r} 15 \\ -8 \\ \hline 7 \end{array}$	$\begin{array}{r} 16 \\ -8 \\ \hline 8 \end{array}$	$\begin{array}{r} 17 \\ -8 \\ \hline 9 \end{array}$
$\begin{array}{r} 10 \\ -9 \\ \hline 1 \end{array}$	$\begin{array}{r} 11 \\ -9 \\ \hline 2 \end{array}$	$\begin{array}{r} 12 \\ -9 \\ \hline 3 \end{array}$	$\begin{array}{r} 13 \\ -9 \\ \hline 4 \end{array}$	$\begin{array}{r} 14 \\ -9 \\ \hline 5 \end{array}$	$\begin{array}{r} 15 \\ -9 \\ \hline 6 \end{array}$	$\begin{array}{r} 16 \\ -9 \\ \hline 7 \end{array}$	$\begin{array}{r} 17 \\ -9 \\ \hline 8 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$

The 81 Multiplication Facts

Through 9 × 9

$\begin{array}{r} 1 \\ \times 1 \\ \hline 1 \end{array}$	$\begin{array}{r} 2 \\ \times 1 \\ \hline 2 \end{array}$	$\begin{array}{r} 3 \\ \times 1 \\ \hline 3 \end{array}$	$\begin{array}{r} 4 \\ \times 1 \\ \hline 4 \end{array}$	$\begin{array}{r} 5 \\ \times 1 \\ \hline 5 \end{array}$	$\begin{array}{r} 6 \\ \times 1 \\ \hline 6 \end{array}$	$\begin{array}{r} 7 \\ \times 1 \\ \hline 7 \end{array}$	$\begin{array}{r} 8 \\ \times 1 \\ \hline 8 \end{array}$	$\begin{array}{r} 9 \\ \times 1 \\ \hline 9 \end{array}$
$\begin{array}{r} 1 \\ \times 2 \\ \hline 2 \end{array}$	$\begin{array}{r} 2 \\ \times 2 \\ \hline 4 \end{array}$	$\begin{array}{r} 3 \\ \times 2 \\ \hline 6 \end{array}$	$\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$	$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array}$	$\begin{array}{r} 6 \\ \times 2 \\ \hline 12 \end{array}$	$\begin{array}{r} 7 \\ \times 2 \\ \hline 14 \end{array}$	$\begin{array}{r} 8 \\ \times 2 \\ \hline 16 \end{array}$	$\begin{array}{r} 9 \\ \times 2 \\ \hline 18 \end{array}$
$\begin{array}{r} 1 \\ \times 3 \\ \hline 3 \end{array}$	$\begin{array}{r} 2 \\ \times 3 \\ \hline 6 \end{array}$	$\begin{array}{r} 3 \\ \times 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$	$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$	$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$	$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$	$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$
$\begin{array}{r} 1 \\ \times 4 \\ \hline 4 \end{array}$	$\begin{array}{r} 2 \\ \times 4 \\ \hline 8 \end{array}$	$\begin{array}{r} 3 \\ \times 4 \\ \hline 12 \end{array}$	$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \end{array}$	$\begin{array}{r} 5 \\ \times 4 \\ \hline 20 \end{array}$	$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$	$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$	$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$
$\begin{array}{r} 1 \\ \times 5 \\ \hline 5 \end{array}$	$\begin{array}{r} 2 \\ \times 5 \\ \hline 10 \end{array}$	$\begin{array}{r} 3 \\ \times 5 \\ \hline 15 \end{array}$	$\begin{array}{r} 4 \\ \times 5 \\ \hline 20 \end{array}$	$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$	$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$	$\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$
$\begin{array}{r} 1 \\ \times 6 \\ \hline 6 \end{array}$	$\begin{array}{r} 2 \\ \times 6 \\ \hline 12 \end{array}$	$\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$	$\begin{array}{r} 4 \\ \times 6 \\ \hline 24 \end{array}$	$\begin{array}{r} 5 \\ \times 6 \\ \hline 30 \end{array}$	$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$	$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array}$	$\begin{array}{r} 9 \\ \times 6 \\ \hline 54 \end{array}$
$\begin{array}{r} 1 \\ \times 7 \\ \hline 7 \end{array}$	$\begin{array}{r} 2 \\ \times 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 3 \\ \times 7 \\ \hline 21 \end{array}$	$\begin{array}{r} 4 \\ \times 7 \\ \hline 28 \end{array}$	$\begin{array}{r} 5 \\ \times 7 \\ \hline 35 \end{array}$	$\begin{array}{r} 6 \\ \times 7 \\ \hline 42 \end{array}$	$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$	$\begin{array}{r} 8 \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 9 \\ \times 7 \\ \hline 63 \end{array}$
$\begin{array}{r} 1 \\ \times 8 \\ \hline 8 \end{array}$	$\begin{array}{r} 2 \\ \times 8 \\ \hline 16 \end{array}$	$\begin{array}{r} 3 \\ \times 8 \\ \hline 24 \end{array}$	$\begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array}$	$\begin{array}{r} 5 \\ \times 8 \\ \hline 40 \end{array}$	$\begin{array}{r} 6 \\ \times 8 \\ \hline 48 \end{array}$	$\begin{array}{r} 7 \\ \times 8 \\ \hline 56 \end{array}$	$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$	$\begin{array}{r} 9 \\ \times 8 \\ \hline 72 \end{array}$
$\begin{array}{r} 1 \\ \times 9 \\ \hline 9 \end{array}$	$\begin{array}{r} 2 \\ \times 9 \\ \hline 18 \end{array}$	$\begin{array}{r} 3 \\ \times 9 \\ \hline 27 \end{array}$	$\begin{array}{r} 4 \\ \times 9 \\ \hline 36 \end{array}$	$\begin{array}{r} 5 \\ \times 9 \\ \hline 45 \end{array}$	$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$	$\begin{array}{r} 7 \\ \times 9 \\ \hline 63 \end{array}$	$\begin{array}{r} 8 \\ \times 9 \\ \hline 72 \end{array}$	$\begin{array}{r} 9 \\ \times 9 \\ \hline 81 \end{array}$

The 81 Division Facts

Through 81 ÷ 9

$\begin{array}{r}1\\1\overline{)1}\end{array}$	$\begin{array}{r}2\\1\overline{)2}\end{array}$	$\begin{array}{r}3\\1\overline{)3}\end{array}$	$\begin{array}{r}4\\1\overline{)4}\end{array}$	$\begin{array}{r}5\\1\overline{)5}\end{array}$	$\begin{array}{r}6\\1\overline{)6}\end{array}$	$\begin{array}{r}7\\1\overline{)7}\end{array}$	$\begin{array}{r}8\\1\overline{)8}\end{array}$	$\begin{array}{r}9\\1\overline{)9}\end{array}$
$\begin{array}{r}1\\2\overline{)2}\end{array}$	$\begin{array}{r}2\\2\overline{)4}\end{array}$	$\begin{array}{r}3\\2\overline{)6}\end{array}$	$\begin{array}{r}4\\2\overline{)8}\end{array}$	$\begin{array}{r}5\\2\overline{)10}\end{array}$	$\begin{array}{r}6\\2\overline{)12}\end{array}$	$\begin{array}{r}7\\2\overline{)14}\end{array}$	$\begin{array}{r}8\\2\overline{)16}\end{array}$	$\begin{array}{r}9\\2\overline{)18}\end{array}$
$\begin{array}{r}1\\3\overline{)3}\end{array}$	$\begin{array}{r}2\\3\overline{)6}\end{array}$	$\begin{array}{r}3\\3\overline{)9}\end{array}$	$\begin{array}{r}4\\3\overline{)12}\end{array}$	$\begin{array}{r}5\\3\overline{)15}\end{array}$	$\begin{array}{r}6\\3\overline{)18}\end{array}$	$\begin{array}{r}7\\3\overline{)21}\end{array}$	$\begin{array}{r}8\\3\overline{)24}\end{array}$	$\begin{array}{r}9\\3\overline{)27}\end{array}$
$\begin{array}{r}1\\4\overline{)4}\end{array}$	$\begin{array}{r}2\\4\overline{)8}\end{array}$	$\begin{array}{r}3\\4\overline{)12}\end{array}$	$\begin{array}{r}4\\4\overline{)16}\end{array}$	$\begin{array}{r}5\\4\overline{)20}\end{array}$	$\begin{array}{r}6\\4\overline{)24}\end{array}$	$\begin{array}{r}7\\4\overline{)28}\end{array}$	$\begin{array}{r}8\\4\overline{)32}\end{array}$	$\begin{array}{r}9\\4\overline{)36}\end{array}$
$\begin{array}{r}1\\5\overline{)5}\end{array}$	$\begin{array}{r}2\\5\overline{)10}\end{array}$	$\begin{array}{r}3\\5\overline{)15}\end{array}$	$\begin{array}{r}4\\5\overline{)20}\end{array}$	$\begin{array}{r}5\\5\overline{)25}\end{array}$	$\begin{array}{r}6\\5\overline{)30}\end{array}$	$\begin{array}{r}7\\5\overline{)35}\end{array}$	$\begin{array}{r}8\\5\overline{)40}\end{array}$	$\begin{array}{r}9\\5\overline{)45}\end{array}$
$\begin{array}{r}1\\6\overline{)6}\end{array}$	$\begin{array}{r}2\\6\overline{)12}\end{array}$	$\begin{array}{r}3\\6\overline{)18}\end{array}$	$\begin{array}{r}4\\6\overline{)24}\end{array}$	$\begin{array}{r}5\\6\overline{)30}\end{array}$	$\begin{array}{r}6\\6\overline{)36}\end{array}$	$\begin{array}{r}7\\6\overline{)42}\end{array}$	$\begin{array}{r}8\\6\overline{)48}\end{array}$	$\begin{array}{r}9\\6\overline{)54}\end{array}$
$\begin{array}{r}1\\7\overline{)7}\end{array}$	$\begin{array}{r}2\\7\overline{)14}\end{array}$	$\begin{array}{r}3\\7\overline{)21}\end{array}$	$\begin{array}{r}4\\7\overline{)28}\end{array}$	$\begin{array}{r}5\\7\overline{)35}\end{array}$	$\begin{array}{r}6\\7\overline{)42}\end{array}$	$\begin{array}{r}7\\7\overline{)49}\end{array}$	$\begin{array}{r}8\\7\overline{)56}\end{array}$	$\begin{array}{r}9\\7\overline{)63}\end{array}$
$\begin{array}{r}1\\8\overline{)8}\end{array}$	$\begin{array}{r}2\\8\overline{)16}\end{array}$	$\begin{array}{r}3\\8\overline{)24}\end{array}$	$\begin{array}{r}4\\8\overline{)32}\end{array}$	$\begin{array}{r}5\\8\overline{)40}\end{array}$	$\begin{array}{r}6\\8\overline{)48}\end{array}$	$\begin{array}{r}7\\8\overline{)56}\end{array}$	$\begin{array}{r}8\\8\overline{)64}\end{array}$	$\begin{array}{r}9\\8\overline{)72}\end{array}$
$\begin{array}{r}1\\9\overline{)9}\end{array}$	$\begin{array}{r}2\\9\overline{)18}\end{array}$	$\begin{array}{r}3\\9\overline{)27}\end{array}$	$\begin{array}{r}4\\9\overline{)36}\end{array}$	$\begin{array}{r}5\\9\overline{)45}\end{array}$	$\begin{array}{r}6\\9\overline{)54}\end{array}$	$\begin{array}{r}7\\9\overline{)63}\end{array}$	$\begin{array}{r}8\\9\overline{)72}\end{array}$	$\begin{array}{r}9\\9\overline{)81}\end{array}$

Extra Practice

		a	b	c	d	e	f	g
Set 1	**1.**	68 +24	44 +96	418 +61	537 +246	750 +177	840 +79	469 +126
	2.	438 +259	486 +423	305 +288	165 +492	179 +603	681 +86	72 +567
Set 2	**1.**	849 +91	367 +475	298 +327	344 +477	779 +55	65 +537	372 +457
	2.	809 +170	585 +135	568 +97	89 +621	648 +59	480 +356	86 +404
Set 3	**1.**	187 45 +397	369 458 +97	194 56 +348	49 198 +650	408 372 +96	354 179 +209	147 376 +89
	2.	63 59 +837	298 56 +145	350 39 +57	207 99 +159	659 143 +156	856 96 +42	188 243 +179
Set 4	Add.							
	1.	384 278 87 156	326 298 57 100	189 278 87 376	556 167 95 73	67 234 58 448	238 275 89 160	319 184 386 59
	2.	589 56 174 92	175 238 309 262	58 376 48 75	340 94 158 375	62 95 478 336	87 645 138 56	409 39 258 136

Set 5

Add.

	a	b	c	d	e	f
1.	1,736 7,724	$54.82 59.77	9,567 484	$42.94 44.25	856 7,626	$45.78 25.94
2.	5,389 253	$48.62 97.97	2,926 6,747	$99.75 6.78	768 8,979	$97.02 48.89

Set 6

Add.

5,639	$73.45	659	$68.94	6,789	$65.43
756	9.60	3,782	0.32	5,973	7.58
1,473	0.07	150	0.54	1,208	29.65
960	59.32	6,887	8.97	7,573	4.79
3,955	18.79	534	75.49	9,284	30.99

Set 7

Add.

a	b	c	d	e
75,498	80,754	3,967	94,759	86,700
4,379	45,639	54,872	13,658	7,593
58,043	71,258	8,645	7,429	845
9,674	9,347	93,075	18,637	71,967

Set 8

Copy in columns and add.

1. $58.96 + $62.95 + $87.50 + $15.60
2. $7.29 + $40.86 + $19.57 + $82.78
3. $65.46 + $47.75 + $97.88 + $0.68 + $7.39
4. $3.95 + $24.83 + $16.47 + $5.49 + $0.67
5. $47.50 + $16.79 + $6.08 + $4.88 + $58.99
6. $19.86 + $46.82 + $14.77 + $36.20 + $39.75

Set 9

	a	b	c	d	e	f	g
1.	82 −47	70 −34	397 −179	875 −73	493 −48	473 −424	649 −567
2.	650 −538	354 −183	374 −29	816 −766	734 −7	607 −400	738 −665

		a	b	c	d	e	f	g
Set 10	1.	734 −669	758 −147	868 −579	783 −247	611 −329	815 −729	720 −58
	2.	468 −298	832 −743	754 −49	652 −170	725 −476	643 −68	686 −437
Set 11	1.	600 −275	913 −607	614 −59	711 −241	703 −598	400 −93	916 −878
	2.	604 −238	200 −96	813 −245	500 −417	660 −69	512 −147	800 −724
Set 12	1.	$3.87 −1.98	600 −326	$9.14 −0.85	$7.02 −1.65	836 −478	515 −106	$4.00 −0.87
	2.	$6.34 −1.87	903 −48	$7.00 −6.91	$8.15 −0.97	412 −389	900 −127	$5.08 −0.79

Set 13

Copy and subtract.

1. 756 − 375	5. $8.03 less $5.23	9. 833 minus 796
2. 904 − 356	6. $6.00 less $3.18	10. 900 minus 431
3. 931 − 83	7. $8.17 less $0.89	11. 705 minus 86
4. 640 − 542	8. $7.04 less $1.68	12. 617 minus 98

		a	b	c	d	e
Set 14	1.	6,100 −2,620	$48.91 −0.97	8,229 −337	4,315 −3,780	$18.83 −17.95
	2.	5,680 −1,753	$24.93 −19.37	8,210 −1,096	3,007 −484	$39.06 −14.78

Set 15

	a	b	c	d	e
1.	$81.66 −42.97	1,230 −792	$41.00 −37.54	6,241 −1,873	$93.71 −35.98
2.	$90.00 −51.23	6,654 −989	$51.70 −49.69	3,918 −949	$67.41 −27.83

Set 16

1.	$171.60 −158.63	47,281 −38,192	39,030 −18,852	$468.12 −75.67	$400.01 −83.24
2.	$548.40 −290.78	76,573 −58,605	90,000 −86,437	$132.74 −84.59	$807.16 −332.47

Set 17

Copy and subtract.

1. 6,900 − 5,948
2. 7,110 − 57
3. 8,703 − 1,855
4. 9,600 − 478
5. $76.12 − $9.83
6. $97.14 − $14.39
7. $40.00 − $34.37
8. $84.76 − $79.98
9. 82,420 − 4,897
10. 48,363 − 38,866
11. 90,000 − 564
12. 53,631 − 19,954

Set 18

Copy and work these examples:

1. Take $89.65 from $90.03.
2. 9,675 + 4,396 + 844 + 8,070 = ?
3. Subtract 9,754 from 15,070.
4. Find the difference between $83.65 and $120.70.
5. $79.56 plus $83.74 plus $265.32 = ?
6. From 90,000 take 42,065.

Set 19

	a	b	c	d	e	f	g
1.	36 ×8	75 ×6	218 ×5	649 ×2	517 ×4	428 ×4	301 ×9
2.	671 ×7	350 ×9	842 ×4	290 ×8	682 ×4	950 ×6	831 ×7

		a	b	c	d	e	f	g
Set 20	**1.**	568 ×4	393 ×6	187 ×7	485 ×8	937 ×5	648 ×3	710 ×9
	2.	694 ×5	359 ×7	726 ×8	849 ×4	587 ×9	934 ×8	764 ×6
Set 21	**1.**	$7.65 ×9	$5.60 ×6	625 ×7	516 ×4	$7.95 ×8	$3.56 ×5	814 ×9
	2.	$5.87 ×7	$4.50 ×6	673 ×9	516 ×5	$6.37 ×8	$4.93 ×6	812 ×7
Set 22	**1.**	$8.04 ×5	$7.60 ×6	974 ×4	605 ×8	$8.36 ×9	$9.00 ×7	407 ×5
	2.	$8.96 ×4	540 ×9	809 ×6	136 ×8	637 ×5	$8.79 ×5	548 ×6

		a	b	c
Set 23	**1.**	3 × 8,923	7 × 2,093	5 × 9,080
	2.	9 × $80.02	6 × 1,879	6 times 63.48
	3.	8 × $17.30	5 × 6,348	9 times 4,209
	4.	8 × 290	8 × 3,465	6 × $79.85
	5.	6 × $8.00	4 × $0.86	9 × $54.36
	6.	9 × 709	8 × $79.08	6 × $39.17

Set 24	**1.** 807 − 165	**5.** 9 × $8.75	**9.** 3,104 − 1,954
	2. 965 + 493	**6.** $20.00 − $3.62	**10.** 8 × 9,675
	3. 8 × 456	**7.** 8,975 + 48	**11.** 282 + 7,056
	4. 4,312 − 874	**8.** 6 × $40.19	**12.** 7 × 6,348

		a	b	c	d	e	f
Set 25	1.	4)248	3)369	6)642	4)828	3)918	7)735
	2.	6)486	5)450	4)804	7)756	8)400	2)864
	3.	8)728	7)217	9)936	8)648	6)540	5)455
Set 26	1.	4)300	7)396	5)425	6)650	8)600	9)294
	2.	6)342	8)584	7)450	3)978	4)768	9)586

		a	b	c	d	e
Set 27	1.	4)1,190	6)3,778	5)1,984	7)5,800	9)6,890
	2.	8)5,498	5)4,129	7)4,810	9)8,787	8)3,902
Set 28	1.	7)8,796	9)2,964	6)8,890	8)4,759	5)7,392
	2.	6)4,693	4)7,075	5)2,736	7)9,498	4)3,066
Set 29	1.	5)$7.50	7)8,900	5)$48.70	6)8,721	7)$68.04
	2.	6)$57.42	5)7,052	8)$60.96	4)5,870	9)$46.71
	3.	3)8,720	8)7,250	3)6,180	7)7,015	8)9,607
Set 30	1.	8)$40.59	7)$84.69	4)3,802	6)$98.75	5)$52.00
	2.	6)$58.95	8)$99.44	6)6,543	5)$75.15	4)$12.36
Set 31	1.	4)8,950	8)$19.34	9)5,937	7)$75.64	7)9,314
	2.	8)9,635	4)$97.20	6)8,052	6)$84.54	4)6,836
Set 32	1.	6)35,400	5)$189.40	7)59,129	6)$245.08	9)76,532
	2.	8)75,216	8)$624.75	4)30,800	9)$420.15	8)50,621

		a	b	c	d	e	f	g
Set 33	1.	25 ×48	63 ×34	85 ×98	46 ×37	97 ×54	69 ×78	56 ×49
	2.	$74 ×68	$0.53 ×90	$49 ×38	$0.86 ×95	$90 ×47	$0.76 ×58	$0.49 ×24

Set 34	1.	372 ×34	$6.48 ×50	457 ×38	$7.19 ×62	695 ×80	$5.85 ×67	$1.96 ×89
	2.	$3.19 ×90	709 ×54	$4.67 ×86	573 ×98	$8.09 ×45	768 ×75	580 ×67
	3.	$3.62 ×70	650 ×69	$4.07 ×84	800 ×50	$9.73 ×38	405 ×87	$9.06 ×80

		a	b	c
Set 35	1.	92 × 5,086	49 × 6,870	80 × 9,805
	2.	39 × 7,309	92 × 5,400	57 × 8,360
	3.	56 × 4,007	27 × 8,094	46 × 7,500
	4.	46 × $60.73	63 × 7,590	84 × $68.00
	5.	35 × $76.08	48 × 3,109	57 × $40.30

		a	b		a	b
Set 36	1.	$\frac{1}{4}$ of 140 = _?_;	$\frac{3}{4}$ of 140 = ?	5.	$\frac{1}{6}$ of $3.54 = _?_;	$\frac{5}{6}$ of $3.54 = ?
	2.	$\frac{1}{5}$ of 235 = _?_;	$\frac{4}{5}$ of 235 = ?	6.	$\frac{1}{8}$ of $5.20 = _?_;	$\frac{7}{8}$ of $5.20 = ?
	3.	$\frac{1}{8}$ of 448 = _?_;	$\frac{3}{8}$ of 448 = ?	7.	$\frac{1}{9}$ of $7.47 = _?_;	$\frac{4}{9}$ of $7.47 = ?
	4.	$\frac{1}{9}$ of 243 = _?_;	$\frac{5}{9}$ of 243 = ?	8.	$\frac{1}{5}$ of $3.95 = _?_;	$\frac{3}{5}$ of $3.95 = ?

Set 37

Change these improper fractions to whole or mixed numbers.

		a	b	c	d	e	f	g	h
Set 37	1.	$\frac{9}{2}$	$\frac{7}{6}$	$\frac{9}{3}$	$\frac{10}{7}$	$\frac{8}{5}$	$\frac{12}{6}$	$\frac{7}{4}$	$\frac{17}{12}$
	2.	$\frac{10}{4}$	$\frac{11}{2}$	$\frac{14}{7}$	$\frac{17}{6}$	$\frac{13}{10}$	$\frac{15}{3}$	$\frac{11}{9}$	$\frac{17}{10}$

Set 38

Change a fraction in the answer to best form.

	a	b	c	d	e	f	g	h
1.	$\frac{5}{8}+\frac{3}{8}$	$\frac{3}{8}+\frac{7}{8}$	$\frac{5}{8}+\frac{1}{8}$	$\frac{4}{5}+\frac{4}{5}$	$\frac{9}{10}+\frac{3}{10}$	$\frac{3}{5}+\frac{4}{5}$	$\frac{7}{12}+\frac{7}{12}$	$\frac{1}{8}+\frac{3}{8}$
2.	$\frac{9}{10}-\frac{3}{10}$	$\frac{5}{8}-\frac{3}{8}$	$\frac{11}{12}-\frac{1}{12}$	$\frac{9}{10}-\frac{1}{10}$	$\frac{4}{5}-\frac{1}{5}$	$\frac{7}{8}-\frac{3}{8}$	$\frac{9}{10}-\frac{7}{10}$	$\frac{3}{4}-\frac{1}{4}$

Set 39

Change any fraction in an answer to best form.

	a	b	c
1.	$\frac{3}{4}+\frac{3}{4}+\frac{3}{4}$	$\frac{9}{10}+\frac{7}{10}+\frac{9}{10}$	$\frac{5}{7}+\frac{6}{7}+\frac{3}{7}$
2.	$\frac{5}{6}+\frac{1}{6}+\frac{5}{6}$	$\frac{11}{12}+\frac{7}{12}+\frac{5}{12}$	$\frac{4}{9}+\frac{7}{9}+\frac{7}{9}$
3.	$\frac{7}{8}+\frac{5}{8}+\frac{7}{8}$	$\frac{9}{16}+\frac{7}{16}+\frac{15}{16}$	$\frac{5}{12}+\frac{11}{12}+\frac{5}{12}$
4.	$\frac{7}{16}+\frac{9}{16}+\frac{7}{16}$	$\frac{7}{9}+\frac{1}{9}+\frac{1}{9}$	$\frac{5}{8}+\frac{5}{8}+\frac{5}{8}$
5.	$\frac{2}{3}+\frac{1}{3}+\frac{2}{3}$	$\frac{9}{10}+\frac{3}{10}+\frac{9}{10}$	$\frac{3}{7}+\frac{2}{7}+\frac{2}{7}$

Set 40

	a	b	c	d	e	f
1.	$40\overline{)270}$	$70\overline{)230}$	$90\overline{)590}$	$50\overline{)480}$	$50\overline{)340}$	$90\overline{)840}$
2.	$60\overline{)410}$	$70\overline{)500}$	$80\overline{)650}$	$70\overline{)650}$	$80\overline{)500}$	$70\overline{)620}$

Set 41

1.	$62\overline{)198}$	$84\overline{)189}$	$91\overline{)657}$	$83\overline{)299}$	$81\overline{)597}$	$64\overline{)179}$
2.	$50\overline{)387}$	$92\overline{)188}$	$82\overline{)359}$	$74\overline{)199}$	$34\overline{)78}$	$54\overline{)129}$

Set 42

1.	$92\overline{)406}$	$83\overline{)315}$	$64\overline{)143}$	$93\overline{)300}$	$74\overline{)164}$	$82\overline{)357}$
2.	$51\overline{)484}$	$62\overline{)270}$	$82\overline{)274}$	$53\overline{)172}$	$94\overline{)200}$	$91\overline{)563}$

Set 43

1.	$75\overline{)615}$	$89\overline{)467}$	$56\overline{)392}$	$78\overline{)479}$	$47\overline{)238}$	$95\overline{)395}$
2.	$32\overline{)268}$	$76\overline{)466}$	$84\overline{)788}$	$67\overline{)479}$	$43\overline{)279}$	$96\overline{)768}$

Set 44

1.	$84\overline{)690}$	$68\overline{)414}$	$76\overline{)402}$	$97\overline{)400}$	$86\overline{)611}$	$65\overline{)532}$
2.	$94\overline{)860}$	$87\overline{)450}$	$69\overline{)281}$	$78\overline{)485}$	$84\overline{)764}$	$75\overline{)530}$

Set 45

Change a fraction in the answer to best form.

	a	b	c	d
1.	$8\frac{1}{4} + 3\frac{1}{4}$	$2\frac{5}{12} + 4\frac{1}{12}$	$4\frac{7}{8} - 1\frac{5}{8}$	$3\frac{11}{12} - 1\frac{5}{12}$
2.	$7\frac{1}{3} + 2\frac{1}{3}$	$\frac{5}{8} + 2\frac{1}{8}$	$2\frac{7}{8} - 1\frac{7}{8}$	$3\frac{5}{8} - \frac{1}{8}$
3.	$1\frac{3}{8} + \frac{1}{8}$	$2\frac{3}{16} + 3\frac{7}{16}$	$6\frac{5}{8} - 4\frac{5}{8}$	$5\frac{2}{3} - 4$
4.	$4\frac{1}{5} + 1\frac{3}{5}$	$2\frac{5}{10} + 4\frac{3}{10}$	$4\frac{7}{10} - 4\frac{3}{10}$	$1\frac{3}{5} - \frac{3}{5}$

Set 46

Add in each example. Then subtract. Give answers in best form.

	a	b	c	d	e	f
1.	$3\frac{5}{6}$ $2\frac{5}{6}$	$8\frac{9}{10}$ $\frac{1}{10}$	$5\frac{9}{16}$ $1\frac{7}{16}$	$4\frac{9}{10}$ $4\frac{7}{10}$	$2\frac{11}{12}$ $1\frac{7}{12}$	$3\frac{4}{5}$ $1\frac{4}{5}$
2.	$8\frac{3}{4}$ $\frac{1}{4}$	$6\frac{9}{10}$ $2\frac{3}{10}$	$5\frac{7}{8}$ $\frac{5}{8}$	$2\frac{15}{16}$ $2\frac{9}{16}$	$9\frac{7}{12}$ $4\frac{5}{12}$	$7\frac{2}{3}$ $5\frac{2}{3}$

Set 47

Subtract in each example. Then add. Give answers in best form.

1.	7 $6\frac{5}{8}$	$4\frac{3}{10}$ $2\frac{9}{10}$	$5\frac{3}{8}$ $1\frac{5}{8}$	$8\frac{1}{4}$ $\frac{3}{4}$	$3\frac{4}{5}$ $1\frac{4}{5}$	$4\frac{5}{16}$ $1\frac{9}{16}$
2.	$1\frac{3}{10}$ $\frac{7}{10}$	$2\frac{1}{8}$ $1\frac{7}{8}$	$7\frac{1}{5}$ $6\frac{3}{5}$	$4\frac{1}{12}$ $2\frac{5}{12}$	6 $\frac{2}{3}$	$8\frac{3}{16}$ $3\frac{7}{16}$

Set 48

Subtract in each example. Then add. Give answers in best form.

1.	$6\frac{1}{4}$ $\frac{3}{4}$	9 $\frac{7}{8}$	$7\frac{1}{8}$ $3\frac{5}{8}$	$8\frac{7}{16}$ $1\frac{13}{16}$	$4\frac{5}{12}$ $2\frac{11}{12}$	$10\frac{5}{8}$ $6\frac{7}{8}$
2.	$7\frac{5}{12}$ $5\frac{5}{12}$	$18\frac{9}{16}$ $9\frac{15}{16}$	$5\frac{3}{8}$ $2\frac{7}{8}$	$4\frac{2}{3}$ $4\frac{1}{3}$	$12\frac{3}{10}$ $8\frac{9}{10}$	$17\frac{4}{5}$ $8\frac{4}{5}$

Set 49

	a	b	c
1.	400 × 700	700 × 639	800 × 930
2.	600 × 392	500 × 807	900 × 509
3.	800 × 576	800 × 715	600 × 513

Set 50

1.	687 × 246	538 × 279	863 × 578
2.	459 × 837	745 × 638	457 × 942

		a	b	c
Set 51	1.	96 × $8.37	863 × 194	74 × $37.28
	2.	743 × $6.59	600 × 508	967 × $8.38
	3.	45 × $32.06	83 × 8,070	59 × $34.06
Set 52	1.	560 × 406	508 × $7.43	400 × 800
	2.	700 × 870	493 × $5.67	530 × 709
	3.	305 × 704	980 × $9.02	604 × 500

		a	b	c	d	e
Set 53	1.	45)495	31)688	23)495	41)869	42)884
	2.	21)894	11)494	32)396	24)265	32)997
	3.	24)289	42)898	70)894	35)385	33)398
Set 54	1.	36)756	27)598	38)874	33)798	34)456
	2.	53)805	64)903	37)888	34)819	24)312
	3.	26)579	62)784	35)525	32)387	63)950
Set 55	1.	51)969	61)1,464	53)1,166	31)1,398	81)1,782
	2.	71)1,654	82)1,886	61)1,525	82)1,768	42)976
	3.	90)8,755	62)1,498	35)395	80)3,960	62)1,998
Set 56	1.	42)2,365	63)2,835	73)6,799	35)817	53)1,378
	2.	82)1,988	73)876	85)1,890	31)1,364	72)4,899
	3.	83)3,652	72)3,960	62)2,798	85)1,795	51)1,734
Set 57	1.	94)2,070	64)790	83)1,909	74)900	63)2,040
	2.	84)1,857	92)3,036	73)2,375	94)1,980	53)1,749
	3.	24)530	93)2,980	72)3,168	61)1,770	92)3,150

		a	b	c	d	e
Set 58	1.	32)2,944	45)675	43)1,505	70)6,250	83)7,802
	2.	37)518	74)5,550	53)4,934	34)1,428	94)1,252
	3.	84)5,208	90)8,047	93)3,906	64)3,340	73)1,352
Set 59	1.	43)$15.20	36)440	63)$21.42	54)1,299	74)$24.60
	2.	52)$8.84	56)1,289	64)$27.78	85)2,040	84)$19.50
Set 60	1.	56)3,920	24)$1.26	63)4,058	52)3,150	73)$55.48
	2.	74)2,220	82)$41.06	74)3,922	38)797	82)$59.88
Set 61	1.	86)$34.40	79)2,384	57)$34.39	83)4,605	94)$32.90
	2.	64)$39.81	85)7,650	54)$19.63	89)6,279	85)$30.00
	3.	83)$53.12	96)7,680	56)$4.49	92)3,312	83)$43.41
Set 62	1.	46)$15.70	87)$5,254	56)1,920	94)$49.20	93)$4,303
	2.	36)$8.64	93)$3,170	83)3,000	42)$27.95	24)$312
	3.	62)$15.74	74)$2,594	34)1,190	94)$3,817	37)$814

Set 63

Reduce to lowest terms all fractions which can be reduced.

	a	b	c	d	e	f	g	h
1.	$\frac{9}{16}$	$\frac{8}{10}$	$\frac{4}{12}$	$\frac{10}{30}$	$\frac{15}{25}$	$\frac{8}{20}$	$\frac{5}{6}$	$\frac{9}{15}$
2.	$\frac{12}{18}$	$\frac{7}{8}$	$\frac{7}{28}$	$\frac{3}{9}$	$\frac{10}{14}$	$\frac{12}{30}$	$\frac{19}{24}$	$\frac{15}{18}$
3.	$\frac{27}{36}$	$\frac{20}{25}$	$\frac{7}{9}$	$\frac{5}{10}$	$\frac{25}{30}$	$\frac{2}{12}$	$\frac{11}{12}$	$\frac{14}{21}$

Set 64

What is missing? Draw diagrams for Ex. 1a and 4a.

	a	b	c	d
1.	$\frac{3}{4} = \frac{?}{16}$	$\frac{2}{3} = \frac{?}{12}$	$\frac{10}{6} = 1\frac{?}{6} = 1\frac{?}{3}$	$\frac{18}{16} = 1\frac{?}{16} = 1\frac{?}{8}$
2.	$\frac{3}{5} = \frac{?}{10}$	$\frac{5}{8} = \frac{?}{16}$	$\frac{12}{8} = 1\frac{?}{8} = 1\frac{?}{2}$	$\frac{20}{12} = 1\frac{?}{12} = 1\frac{?}{3}$
3.	$\frac{7}{8} = \frac{?}{16}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{18}{10} = 1\frac{?}{10} = 1\frac{?}{5}$	$\frac{15}{8} = 1\frac{?}{8}$
4.	$\frac{4}{5} = \frac{?}{10}$	$\frac{3}{4} = \frac{?}{12}$	$\frac{21}{12} = 1\frac{?}{12} = 1\frac{?}{4}$	$\frac{10}{4} = 2\frac{?}{4} = 2\frac{?}{2}$

Set 65

Add.
Give answers
in best form.

	a	b	c	d	e	f	g	h
1.	$\frac{3}{4}$ $\frac{1}{16}$	$\frac{1}{4}$ $\frac{1}{12}$	$\frac{1}{5}$ $\frac{1}{10}$	$\frac{7}{16}$ $\frac{1}{4}$	$\frac{1}{2}$ $\frac{1}{10}$	$\frac{3}{16}$ $\frac{1}{8}$	$\frac{1}{2}$ $\frac{1}{12}$	$\frac{1}{3}$ $\frac{1}{12}$
2.	$\frac{4}{5}$ $\frac{1}{10}$	$\frac{3}{4}$ $\frac{1}{12}$	$\frac{7}{16}$ $\frac{1}{8}$	$\frac{3}{10}$ $\frac{1}{2}$	$\frac{9}{16}$ $\frac{1}{4}$	$\frac{5}{6}$ $\frac{1}{12}$	$\frac{9}{16}$ $\frac{1}{8}$	$\frac{1}{10}$ $\frac{3}{5}$

Set 66

Add.
Give answers
in best form.

1.	$\frac{2}{3}$ $\frac{5}{12}$	$\frac{3}{4}$ $\frac{11}{16}$	$\frac{4}{5}$ $\frac{3}{10}$	$\frac{5}{8}$ $\frac{3}{16}$	$\frac{9}{10}$ $\frac{2}{5}$	$\frac{11}{12}$ $\frac{2}{3}$	$\frac{3}{8}$ $\frac{5}{16}$	$\frac{4}{5}$ $\frac{7}{10}$
2.	$\frac{3}{8}$ $\frac{3}{16}$	$\frac{3}{4}$ $\frac{7}{12}$	$\frac{11}{12}$ $\frac{3}{4}$	$\frac{7}{8}$ $\frac{13}{16}$	$\frac{3}{5}$ $\frac{3}{10}$	$\frac{3}{8}$ $\frac{3}{4}$	$\frac{2}{3}$ $\frac{5}{12}$	$\frac{13}{16}$ $\frac{3}{8}$

Set 67

Subtract.
Give answers
in best form.

1.	$\frac{7}{8}$ $\frac{1}{4}$	$\frac{5}{8}$ $\frac{7}{16}$	$\frac{9}{10}$ $\frac{4}{5}$	$\frac{5}{6}$ $\frac{5}{12}$	$\frac{15}{16}$ $\frac{7}{8}$	$\frac{7}{10}$ $\frac{1}{2}$	$\frac{11}{16}$ $\frac{5}{8}$	$\frac{11}{12}$ $\frac{1}{2}$
2.	$\frac{5}{8}$ $\frac{9}{16}$	$\frac{7}{12}$ $\frac{1}{6}$	$\frac{11}{12}$ $\frac{1}{6}$	$\frac{9}{16}$ $\frac{1}{4}$	$\frac{11}{16}$ $\frac{3}{8}$	$\frac{4}{5}$ $\frac{7}{10}$	$\frac{15}{16}$ $\frac{3}{4}$	$\frac{1}{4}$ $\frac{3}{16}$

Set 68

Add.
Give answers
in best form.

$\frac{3}{4}$ $\frac{5}{8}$ $\frac{1}{2}$	$\frac{4}{5}$ $\frac{1}{2}$ $\frac{3}{10}$	$\frac{2}{3}$ $\frac{7}{12}$ $\frac{1}{4}$	$\frac{5}{16}$ $\frac{1}{2}$ $\frac{3}{4}$	$\frac{5}{12}$ $\frac{1}{3}$ $\frac{3}{4}$	$\frac{7}{10}$ $\frac{3}{5}$ $\frac{1}{2}$	$\frac{1}{3}$ $\frac{1}{2}$ $\frac{5}{6}$	$\frac{1}{6}$ $\frac{2}{3}$ $\frac{7}{12}$

Set 69

1.	$6\frac{1}{4}$ $+2\frac{3}{8}$	$2\frac{1}{6}$ $+1\frac{1}{3}$	$10\frac{3}{4}$ $-5\frac{7}{12}$	$8\frac{1}{2}$ $-7\frac{1}{12}$	$4\frac{5}{12}$ $+2\frac{1}{3}$	$7\frac{2}{5}$ $+\frac{3}{10}$
2.	$5\frac{2}{3}$ $-2\frac{5}{12}$	$12\frac{7}{10}$ -8	$9\frac{3}{16}$ $+5\frac{1}{4}$	$8\frac{1}{2}$ $+\frac{1}{6}$	$15\frac{3}{4}$ $-9\frac{1}{2}$	$20\frac{7}{8}$ $-19\frac{7}{16}$

Set 70

Add. Give
answers in best
form.

	a	b	c	d	e	f
1.	$5\frac{3}{16}$ $2\frac{7}{8}$	$4\frac{1}{2}$ $\frac{9}{10}$	$7\frac{1}{3}$ $3\frac{7}{12}$	$9\frac{5}{16}$ $1\frac{3}{4}$	$5\frac{2}{3}$ $4\frac{5}{6}$	$8\frac{7}{12}$ $3\frac{5}{6}$
2.	$12\frac{3}{5}$ $9\frac{7}{10}$	$6\frac{3}{8}$ $4\frac{5}{16}$	$15\frac{3}{4}$ $7\frac{11}{12}$	$8\frac{5}{12}$ $\frac{2}{3}$	$5\frac{7}{16}$ $4\frac{1}{2}$	$11\frac{3}{10}$ $9\frac{4}{5}$

			a	b	c	d	e	f
Set 71	Subtract. Give answers in best form.	1.	$4\frac{3}{10}$ $\underline{1\frac{2}{5}}$	$3\frac{5}{8}$ $\underline{2\frac{13}{16}}$	$7\frac{1}{3}$ $\underline{3\frac{5}{12}}$	$4\frac{7}{16}$ $\underline{\frac{3}{4}}$	$8\frac{5}{12}$ $\underline{2\frac{3}{4}}$	$16\frac{3}{5}$ $\underline{8\frac{9}{10}}$
		2.	$9\frac{1}{2}$ $\underline{7\frac{11}{12}}$	$3\frac{7}{10}$ $\underline{\frac{4}{5}}$	$9\frac{3}{8}$ $\underline{8\frac{5}{16}}$	$6\frac{7}{12}$ $\underline{1\frac{2}{3}}$	$4\frac{1}{2}$ $\underline{2\frac{15}{16}}$	$17\frac{11}{16}$ $\underline{12\frac{7}{8}}$
Set 72	Add. Give answers in best form.	1.	$2\frac{4}{5}$ $\frac{1}{2}$ $\underline{4\frac{3}{10}}$	$4\frac{2}{3}$ $1\frac{5}{12}$ $\underline{8\frac{3}{4}}$	$\frac{5}{8}$ $7\frac{5}{16}$ $\underline{5\frac{1}{2}}$	$3\frac{7}{12}$ $1\frac{1}{6}$ $\underline{6\frac{3}{4}}$	$2\frac{3}{4}$ $4\frac{7}{8}$ $\underline{\frac{1}{2}}$	$8\frac{5}{6}$ $1\frac{2}{3}$ $\underline{3\frac{1}{2}}$
		2.	$\frac{7}{8}$ $2\frac{3}{4}$ $\underline{4\frac{9}{16}}$	$7\frac{2}{3}$ $5\frac{11}{12}$ $\underline{\frac{5}{6}}$	$1\frac{1}{2}$ $3\frac{7}{10}$ $\underline{4\frac{3}{5}}$	$5\frac{11}{16}$ $\frac{1}{4}$ $\underline{7\frac{5}{8}}$	$8\frac{5}{6}$ $9\frac{5}{12}$ $\underline{7\frac{1}{3}}$	$\frac{3}{4}$ $9\frac{5}{6}$ $\underline{2\frac{11}{12}}$

		a	b	c	d	e	f
Set 73	1.	$85\overline{)492}$	$74\overline{)573}$	$45\overline{)340}$	$85\overline{)587}$	$65\overline{)560}$	$24\overline{)198}$
	2.	$94\overline{)708}$	$67\overline{)317}$	$88\overline{)411}$	$54\overline{)498}$	$66\overline{)583}$	$64\overline{)598}$
	3.	$74\overline{)680}$	$78\overline{)594}$	$63\overline{)597}$	$89\overline{)760}$	$77\overline{)445}$	$83\overline{)600}$
Set 74	1.	$49\overline{)224}$	$56\overline{)265}$	$53\overline{)401}$	$59\overline{)346}$	$47\overline{)210}$	$34\overline{)250}$
	2.	$67\overline{)385}$	$39\overline{)179}$	$46\overline{)350}$	$87\overline{)749}$	$73\overline{)500}$	$49\overline{)357}$
	3.	$48\overline{)314}$	$43\overline{)307}$	$57\overline{)436}$	$62\overline{)455}$	$67\overline{)448}$	$84\overline{)650}$

		a	b	c	d	e
Set 75	1.	$75\overline{)5,700}$	$55\overline{)4,538}$	$25\overline{)1,565}$	$34\overline{)2,918}$	$69\overline{)5,841}$
	2.	$47\overline{)2,134}$	$89\overline{)6,593}$	$77\overline{)4,215}$	$86\overline{)4,872}$	$58\overline{)2,010}$
	3.	$56\overline{)4,850}$	$67\overline{)3,662}$	$88\overline{)7,490}$	$74\overline{)5,867}$	$68\overline{)3,232}$
Set 76	1.	$57\overline{)2,205}$	$59\overline{)\$37.40}$	$66\overline{)3,200}$	$87\overline{)3,305}$	$75\overline{)\$29.97}$
	2.	$78\overline{)2,804}$	$89\overline{)\$47.50}$	$58\overline{)2,657}$	$79\overline{)2,900}$	$55\overline{)\$41.00}$
	3.	$38\overline{)1,785}$	$76\overline{)\$66.64}$	$49\overline{)3,698}$	$76\overline{)2,933}$	$64\overline{)\$50.00}$

		a	b	c	d	e
Set 77	1.	37)638	39)904	55)4,117	25)1,634	45)3,768
	2.	75)4,428	85)5,880	94)8,163	45)3,525	68)5,030
	3.	56)1,400	44)2,524	76)5,590	84)7,478	74)5,773
Set 78	1.	37)3,440	46)$13.78	54)5,286	27)$8.37	29)2,291
	2.	49)2,842	89)$60.00	44)4,087	45)$40.38	28)2,492
Set 79	1.	87)$70.58	26)2,215	46)$38.18	58)5,198	59)$49.00
	2.	76)$27.36	39)3,875	79)$60.04	67)6,304	74)$58.39
Set 80	1.	16)862	74)5,837	18)1,073	46)3,790	17)1,680
	2.	89)8,271	19)1,895	85)5,830	14)1,190	28)2,590
Set 81	1.	79)6,359	48)$39.76	89)8,047	17)$12.49	39)3,526
	2.	47)3,760	18)$13.50	85)5,637	14)$9.00	27)2,440
Set 82	1.	13)$12.80	24)1,128	66)5,802	79)7,504	19)$9.60
	2.	68)$54.93	18)1,578	94)8,648	29)865	74)$52.09
Set 83	1.	79)7,330	47)980	68)6,052	69)2,691	76)5,320
	2.	15)1,493	39)2,730	74)4,480	47)3,150	26)2,359
Set 84	1.	19)$13.97	97)6,790	87)$60.28	12)1,032	88)$61.60
	2.	96)$90.37	15)1,137	43)$36.02	94)5,679	29)$18.79
Set 85	1.	35)8,470	17)5,593	36)8,028	25)8,775	14)3,287
	2.	28)9,688	38)9,000	19)5,643	36)9,879	18)4,652

		a	b	c	d
Set 86	1.	42)9,880	39)9,180	27)8,415	18)7,848
	2.	75)9,075	26)9,750	15)8,796	34)8,126
Set 87	1.	73)35,040	87)33,950	63)50,306	55)37,408
	2.	57)37,089	16)9,578	54)32,184	65)44,180
Set 88	1.	78)$684.00	56)21,000	89)$694.20	34)25,820
	2.	19)$158.96	37)24,975	18)$87.59	49)28,322
Set 89	1.	54)16,524	76)61,500	68)60,996	58)39,092
	2.	86)68,000	17)8,313	74)7,954	39)19,080
Set 90	1.	76)61,234	89)53,667	18)15,750	98)85,260
	2.	85)54,427	36)18,216	17)15,436	57)34,700
Set 91	1.	59)$503.86	15)14,407	48)36,489	83)$584.32
	2.	65)$329.55	80)$316.80	16)15,897	36)$208.08
Set 92	1.	50)30,031	97)$779.88	87)43,562	68)$659.60
	2.	39)27,315	56)$200.48	28)25,209	48)$324.00
Set 93	1.	89)$445.00	45)40,815	65)$522.60	99)70,354
	2.	95)$724.90	29)23,204	58)$560.86	16)7,829
Set 94	1.	14)1,299	56)$194.88	83)$5,820	67)54,203
	2.	89)7,031	23)$155.25	14)$1,194	94)84,675

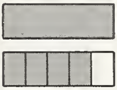
Set 95

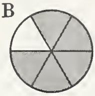
	a	b	c	d
1.	$59\overline{)23{,}954}$	$73\overline{)4{,}405}$	$38\overline{)\$215.46}$	$19\overline{)\$7{,}657}$
2.	$79\overline{)63{,}205}$	$15\overline{)1{,}493}$	$26\overline{)\$197.34}$	$54\overline{)\$5{,}238}$

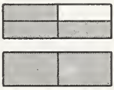
Set 96

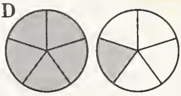
In which picture below does the shaded part show

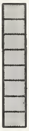
1. $\frac{5}{6}$? 2. $\frac{8}{8}$? 3. $1\frac{4}{5}$? 4. $\frac{6}{5}$? 5. $1\frac{3}{4}$?

A


B


C


D


E


Set 97

Draw and color pictures to show each of these:

1. $\frac{6}{6}$ 2. $\frac{8}{5}$ 3. $\frac{5}{8}$ 4. $1\frac{2}{3}$ 5. $1\frac{5}{4}$ 6. $\frac{4}{3}$

Set 98

Copy and supply the missing numerators. Draw diagrams for Ex. 2a; 3b; 4a.

	a	b	c	d	e
1.	$\frac{1}{3} = \frac{?}{12}$	$\frac{1}{5} = \frac{?}{20}$	$\frac{1}{4} = \frac{?}{20}$	$\frac{1}{5} = \frac{?}{15}$	$\frac{1}{6} = \frac{?}{24}$
2.	$\frac{2}{3} = \frac{?}{12}$	$\frac{2}{5} = \frac{?}{20}$	$\frac{3}{4} = \frac{?}{20}$	$\frac{2}{5} = \frac{?}{15}$	$\frac{5}{6} = \frac{?}{24}$
3.	$\frac{1}{4} = \frac{?}{12}$	$\frac{3}{5} = \frac{?}{20}$	$\frac{1}{3} = \frac{?}{15}$	$\frac{3}{5} = \frac{?}{15}$	$\frac{1}{3} = \frac{?}{30}$
4.	$\frac{3}{4} = \frac{?}{12}$	$\frac{4}{5} = \frac{?}{20}$	$\frac{2}{3} = \frac{?}{15}$	$\frac{4}{5} = \frac{?}{15}$	$\frac{2}{3} = \frac{?}{30}$

Set 99

Copy and supply the missing numerators in each group of equal fractions.

1. $\frac{1}{2} = \frac{?}{4} = \frac{?}{6} = \frac{?}{8} = \frac{?}{10} = \frac{?}{12}$
2. $\frac{1}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12} = \frac{?}{15} = \frac{?}{18}$
3. $\frac{1}{4} = \frac{?}{8} = \frac{?}{12} = \frac{?}{16} = \frac{?}{20} = \frac{?}{24}$
4. $\frac{1}{5} = \frac{?}{10} = \frac{?}{15} = \frac{?}{20} = \frac{?}{25} = \frac{?}{30}$
5. $\frac{2}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12} = \frac{?}{15}$
6. $\frac{3}{4} = \frac{?}{8} = \frac{?}{12} = \frac{?}{16} = \frac{?}{20}$
7. $\frac{4}{5} = \frac{?}{10} = \frac{?}{15} = \frac{?}{20} = \frac{?}{25}$
8. $\frac{5}{6} = \frac{?}{12} = \frac{?}{18} = \frac{?}{24} = \frac{?}{30}$

Set 100

Copy and supply the missing numerators. Draw diagrams for Ex. 1a and 2b.

	a		c	d	e
1.	$\frac{2}{3} = \frac{?}{12}$	$\frac{5}{6} = \frac{?}{24}$	$\frac{7}{8} = \frac{?}{16}$	$\frac{3}{5} = \frac{?}{20}$	$\frac{7}{10} = \frac{?}{30}$
2.	$\frac{3}{4} = \frac{?}{20}$	$\frac{2}{5} = \frac{?}{10}$	$\frac{9}{10} = \frac{?}{20}$	$\frac{5}{8} = \frac{?}{24}$	$\frac{4}{5} = \frac{?}{25}$
3.	$\frac{3}{10} = \frac{?}{20}$	$\frac{5}{6} = \frac{?}{12}$	$\frac{3}{4} = \frac{?}{16}$	$\frac{4}{5} = \frac{?}{10}$	$\frac{7}{8} = \frac{?}{24}$

Set 101

Copy and reduce to lowest terms fractions which can be reduced.

	a	b	c	d	e	f	g	h
1.	$\frac{8}{10}$	$\frac{12}{16}$	$\frac{5}{15}$	$\frac{11}{12}$	$\frac{18}{24}$	$\frac{12}{20}$	$\frac{6}{16}$	$\frac{9}{15}$
2.	$\frac{9}{20}$	$\frac{20}{24}$	$\frac{21}{30}$	$\frac{12}{18}$	$\frac{7}{15}$	$\frac{14}{16}$	$\frac{6}{10}$	$\frac{10}{25}$
3.	$\frac{10}{16}$	$\frac{27}{30}$	$\frac{15}{20}$	$\frac{15}{24}$	$\frac{10}{15}$	$\frac{12}{30}$	$\frac{15}{18}$	$\frac{3}{25}$

Set 102

Copy and reduce to lowest terms fractions which can be reduced.

1.	$\frac{8}{12}$	$\frac{4}{10}$	$\frac{6}{15}$	$\frac{6}{12}$	$\frac{8}{20}$	$\frac{7}{9}$	$\frac{8}{24}$	$\frac{5}{12}$
2.	$\frac{12}{15}$	$\frac{16}{24}$	$\frac{10}{12}$	$\frac{9}{24}$	$\frac{9}{10}$	$\frac{10}{18}$	$\frac{9}{15}$	$\frac{15}{30}$
3.	$\frac{16}{20}$	$\frac{5}{10}$	$\frac{18}{20}$	$\frac{14}{20}$	$\frac{20}{30}$	$\frac{9}{12}$	$\frac{21}{24}$	$\frac{18}{20}$

Set 103

Copy and change each improper fraction to a whole or a mixed number. Be sure that answers are in best form.

1.	$\frac{17}{10}$	$\frac{24}{12}$	$\frac{15}{16}$	$\frac{32}{15}$	$\frac{21}{10}$	$\frac{27}{24}$	$\frac{29}{12}$	$\frac{11}{12}$
2.	$\frac{24}{15}$	$\frac{25}{10}$	$\frac{20}{16}$	$\frac{19}{24}$	$\frac{18}{9}$	$\frac{35}{15}$	$\frac{36}{24}$	$\frac{38}{12}$

Set 104

Add. Give answers in best form.

	a	b	c	d	e	f	g	h
1.	$\frac{1}{2}$ $\frac{1}{3}$	$\frac{2}{5}$ $\frac{1}{3}$	$\frac{2}{3}$ $\frac{1}{2}$	$\frac{3}{5}$ $\frac{1}{4}$	$\frac{11}{12}$ $\frac{5}{6}$	$\frac{1}{3}$ $\frac{1}{8}$	$\frac{2}{5}$ $\frac{1}{4}$	$\frac{3}{4}$ $\frac{1}{6}$
2.	$\frac{3}{5}$ $\frac{1}{2}$	$\frac{5}{6}$ $\frac{1}{4}$	$\frac{4}{5}$ $\frac{1}{3}$	$\frac{7}{8}$ $\frac{5}{16}$	$\frac{2}{3}$ $\frac{2}{5}$	$\frac{5}{6}$ $\frac{3}{4}$	$\frac{3}{4}$ $\frac{2}{5}$	$\frac{2}{3}$ $\frac{5}{8}$

Set 105

Add. Give answers in best form.

	a	b	c	d	e	f
1.	$8\frac{1}{2}$ $1\frac{2}{5}$	$7\frac{3}{4}$ $2\frac{5}{8}$	$5\frac{3}{4}$ $3\frac{1}{6}$	$8\frac{4}{5}$ $\frac{3}{4}$	$2\frac{5}{6}$ $1\frac{5}{12}$	$9\frac{7}{8}$ $6\frac{2}{3}$
2.	$6\frac{2}{3}$ $5\frac{7}{12}$	$4\frac{5}{8}$ $2\frac{1}{3}$	$7\frac{9}{10}$ $4\frac{3}{5}$	$4\frac{7}{8}$ $1\frac{1}{3}$	$5\frac{3}{4}$ $\frac{2}{3}$	$8\frac{3}{4}$ $2\frac{3}{5}$

Set 106

Copy and supply the missing numerators.

	a	b	c	d
1.	$2 = 1\frac{?}{8}$	$5 = 4\frac{?}{3}$	$7 = 6\frac{?}{4}$	$9 = 8\frac{?}{5}$
2.	$3\frac{1}{5} = 2\frac{?}{5}$	$4\frac{1}{10} = 3\frac{?}{10}$	$8\frac{4}{15} = 7\frac{?}{15}$	$7\frac{3}{20} = 6\frac{?}{20}$
3.	$6\frac{5}{12} = 5\frac{?}{12}$	$9\frac{3}{16} = 8\frac{?}{16}$	$5\frac{1}{6} = 4\frac{?}{6}$	$2\frac{5}{24} = 1\frac{?}{24}$

Set 107

	a	b	c	d
1.	$9\frac{1}{4} - 6\frac{3}{5}$	$4\frac{1}{2} - \frac{2}{3}$	$7\frac{1}{3} - 6\frac{3}{4}$	$9 - 2\frac{5}{12}$
2.	$6\frac{4}{5} - \frac{1}{2}$	$5\frac{3}{16} - 4\frac{7}{8}$	$9\frac{2}{5} - 7\frac{3}{4}$	$7\frac{5}{16} - 2\frac{3}{4}$
3.	$4\frac{1}{3} - 2\frac{3}{5}$	$7\frac{1}{6} - 5\frac{3}{4}$	$6\frac{3}{10} - 1\frac{3}{5}$	$8\frac{7}{12} - 1\frac{5}{6}$
4.	$8\frac{2}{3} - 5\frac{7}{12}$	$6\frac{7}{8} - 4\frac{2}{3}$	$8\frac{5}{6} - 2\frac{3}{4}$	$4\frac{2}{3} - 1\frac{3}{5}$

Set 108

Give answers in best form.

	a	b	c	d	e	f
1.	$8\frac{3}{5}$ $-4\frac{9}{10}$	$\frac{2}{3}$ $+8\frac{3}{4}$	$9\frac{3}{4}$ $-7\frac{2}{5}$	$6\frac{7}{8}$ $+2\frac{3}{4}$	$8\frac{3}{5}$ $-1\frac{2}{3}$	$8\frac{1}{2}$ $+\frac{4}{5}$
2.	2 $-\frac{9}{16}$	$15\frac{7}{12}$ $+8\frac{5}{6}$	$10\frac{5}{6}$ $-\frac{3}{4}$	$7\frac{3}{5}$ $+3\frac{5}{6}$	$12\frac{3}{4}$ $-4\frac{15}{16}$	$14\frac{5}{8}$ $+19\frac{2}{3}$

Set 109

Add. Give answers in best form.

	a	b	c	d	e	f
1.	$4\frac{3}{5}$ $7\frac{1}{2}$ $8\frac{9}{10}$	$1\frac{7}{8}$ $9\frac{2}{3}$ $5\frac{1}{4}$	$5\frac{1}{3}$ $7\frac{4}{5}$ 6	$\frac{2}{3}$ $8\frac{3}{4}$ $5\frac{1}{2}$	$2\frac{5}{8}$ $9\frac{7}{16}$ $8\frac{3}{4}$	$24\frac{5}{6}$ $15\frac{3}{4}$ $7\frac{1}{2}$
2.	$5\frac{3}{8}$ $4\frac{2}{3}$ $6\frac{7}{12}$	$1\frac{4}{5}$ $2\frac{3}{4}$ $\frac{1}{2}$	$4\frac{9}{10}$ $6\frac{2}{3}$ $7\frac{4}{5}$	$4\frac{2}{3}$ $1\frac{1}{2}$ $\frac{5}{6}$	$1\frac{1}{6}$ $7\frac{2}{3}$ $8\frac{1}{4}$	$7\frac{5}{12}$ $\frac{5}{6}$ $2\frac{2}{3}$

Set 110

In dividing, write any remainder in a fraction in lowest terms.

	a	b	c	d	e
1.	$\frac{150}{4}$	894 ×7	$12\overline{)459}$	\$59.75 −9.86	$\frac{1}{8}$ of 478 = ?
2.	$\frac{380}{15}$	\$38.95 +27.48	$16\overline{)984}$	\$60.00 −18.86	$\frac{1}{10}$ of 945 = ?

Set 111

Check by working again with common fractions.

	a	b	c	d	e	f
1.	0.9 +0.5	1.8 +0.7	2.4 +1.6	0.8 +2.3	5.1 +2.8	1.6 +2.7
2.	0.9 −0.3	2.8 −0.9	4.0 −1.6	3.7 −2.7	3.4 −2.9	4.2 −1.5

Set 112

Write these numbers as decimals:

	a	b	c	d	e	f	g	h
1.	$\frac{1}{10}$	$\frac{6}{100}$	$2\frac{1}{10}$	$3\frac{8}{10}$	$\frac{9}{10}$	$1\frac{3}{100}$	$2\frac{5}{10}$	$\frac{4}{10}$
2.	$\frac{8}{100}$	$\frac{17}{100}$	$1\frac{8}{10}$	$\frac{69}{100}$	$2\frac{14}{100}$	$1\frac{3}{10}$	$\frac{99}{100}$	$2\frac{7}{100}$

Write these decimals as common fractions or mixed numbers:

3.	0.7	0.07	0.11	1.1	0.54	3.4	2.10	7.75
4.	0.06	0.6	0.42	4.2	0.79	9.78	3.08	2.22

Set 113

	a	b	c	d	e	f
1.	15.0 −9.7	2.45 −1.18	9.03 −0.76	7.10 −6.54	20.0 −9.1	17.3 −16.8
2.	8.5 1.9 +4.7	28.9 1.3 +0.7	58.75 2.98 +0.67	7.46 8.97 +3.85	6.8 48.7 +5.9	1.17 0.35 +3.86

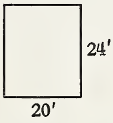
Set 114

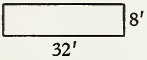
Find n.

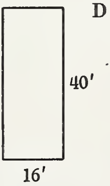
	a	b	c
1.	$67.8 + n = 90.2$	$n \times 85 = 765$	$n \div 47 = 95$
2.	$83.2 - n = 47.5$	$78 \times n = \$49.92$	$1{,}634 \div n = 19$
3.	$n - 0.86 = 5.30$	$n = 49 \times \$0.76$	$\$88.81 \div 83 = n$
4.	$n + 279 = 400$	$8{,}901 = n \times 43$	$n = \$31.26 \div 26$
5.	$2.54 = n - 0.75$	$7{,}800 = 60 \times n$	$32 = n \div 98$
6.	$4.38 = 7.34 - n$	$n \times 58 = 7{,}134$	$54 = 4{,}590 \div n$
7.	$537 - 489 = n$	$37 \times n = \$77.33$	$7{,}918 \div n = 74$

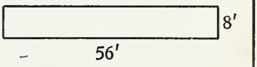
Set 115

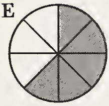
Find the perimeter and the area of each rectangle.

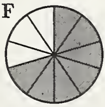
A


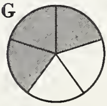
B


C


D


E


F


G


What part of picture E is shaded? of F? of G?

Set 116

Copy and write the missing numbers:

1. 5.6, 5.7, _?_, _?_, _?_, _?_, _?_, 6.3
2. 8.15, 8.16, _?_, _?_, _?_, _?_, _?_, 8.22
3. 6.99, _?_, _?_, _?_, _?_, _?_, 7.05, 7.06
4. 3.06, 3.07, _?_, _?_, _?_, _?_, _?_, 3.13

Set 117

a	b	c	d	e	f
1.7 +8.0	2.7 +0.9	25.4 −18.8	56.7 +5.5	325.2 +0.9	6.5 +8.9
6.3 −0.9	7.0 −0.5	46.5 +21.8	39.2 −8.7	531.4 +3.8	9.1 −0.7

Set 118

a	b	c	d	e
5.45 0.21 +7.53	9.07 3.48 +1.59	2.75 1.93 +5.08	29.41 16.39 +72.62	65.08 42.91 +17.75
8.07 −1.93	6.75 −2.98	7.25 −3.79	25.45 −18.98	45.39 −7.68

Set 119

Find

1. the number of square feet in 18 sq. yd.
2. the number of square yards in 270 sq. ft.
3. the area of a rug advertised as 9′ × 12′.
4. the area of a floor 10′ × 15′.
5. the size in square inches of an opening 4″ × 9″.
6. the number of square yards of linoleum for a floor 10′ × 18′.
7. the area of a garden 16 ft. long by 5 ft. wide.
8. the area of your school desk.

Tables of Measures

Liquid Measure

2 pints = 1 quart (qt.)
4 quarts = 1 gallon (gal.)

Dry Measure

2 pints (pt.) = 1 quart (qt.)
4 quarts = 1 gallon (gal.)
2 gallons = 1 peck (pk.)
4 pecks = 1 bushel (bu.)

Cooking Measures

3 teaspoons (tsp.) = 1 tablespoon (tbsp.)
16 tablespoons = 1 cup (c.)
2½ cups = 1 pint (pt.)
5 cups = 1 quart (qt.)

Measures of Weight

16 ounces (oz.) = 1 pound (lb.)
100 pounds = 1 hundredweight (cwt.)
2,000 pounds = 1 ton (T.)

Measures in Counting

12 things = 1 dozen (doz.)
12 dozen = 1 gross
144 things = 1 gross

Measures of Time

60 seconds (sec.) = 1 minute (min.)
60 minutes = 1 hour (hr.)
24 hours = 1 day (da.)
7 days = 1 week (wk.)
30 days = 1 month (mo.)
52 weeks = 1 year (yr.)
12 months = 1 year
365 days = 1 year
366 days = 1 leap year
10 years = 1 decade
100 years = 1 century

Measures of Length

12 inches (in.) = 1 foot (ft.)
3 feet (ft.) = 1 yard (yd.)
36 inches = 1 yard
5½ yards = 1 rod (rd.)
16½ feet = 1 rod
5,280 feet = 1 mile (mi.)
1,760 yards = 1 mile
320 rods = 1 mile

Measures of Surface, or Square Measure

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet (sq. ft.) = 1 square yard (sq. yd.)
30¼ square yards = 1 square rod (sq. rd.)
160 square rods = 1 acre (A.)
640 A. = 1 square mile (sq. mi.)

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